

COAL AGE

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Let Safety Help the War

DURING the past few months, Uncle Sam has made two demands and one request of the coal industry. All three have been complied with so promptly and willingly that the entire country is proud of the men in and about the coal mines.

The Government has demanded that the men load clean coal at the working face, and that the operator ship only coal that will pass a rigid inspection as being practically free from slate and bone. The nation also demanded that the mines and the individual miners work full time as far as humanly possible. These were followed by the request that the coal companies and their employees invest a large part of their earnings in Liberty Bonds.

How well the two demands have been met can be determined from a study of the reports of the Fuel Administration and by a comparison of tonnages for 1917 and 1918. The spirit with which the request was responded to is readily revealed by a visit to any mining town, where the honor flag of the Third Liberty Loan and the newer flag of the Fourth Liberty Loan float proudly below the Stars and Stripes.

We now have another duty to our Government—one that is peculiar to this season of the year, and which is especially important at this time. The country needs every ounce of coal that can be produced if our boys on the other side who have the "Hun on the run" are to keep him going. We cannot produce this coal unless we look at once into the condition of our mines and take the necessary steps to insure that they do not,

with the coming of cold weather, become so dry that they are in an explosive condition. An explosion that closes down a mine may result in the loss of an important battle, or in the slowing down of a big drive toward Berlin.

Our mines must not get into such a condition this winter that an explosion may occur. It is the duty of every one of us to see to this. Each of us has his part to do in this work, the miners no less than the superintendent.

Mr. Superintendent and Mr. Foreman, your part is to see that there are no accumulations of explosive coal dust anywhere in your workings. Remove all such accumulations at once, and watch carefully for any sources of explosive coal dust. Remember that a dry and dusty mine is a dangerous one. Don't let yours be of this character.

Miners, your part is to see that nothing is done in your working place that may bring about an explosion. Make sure that every shot has a good chance; don't drill a hole "on the dead." The due observance of these precautions will make blown-out shots less likely, and you well know that every windy or blownout shot may mean an explosion that may shut the mine down indefinitely—perhaps with you and your buddies inside. If the mine in which you work is gaseous, remember that a smoke after dinner may also cause a serious explosion. Take your last smoke on the surface before going into the mine, and don't run the chance of hindering Uncle Sam by "lighting up" underground.

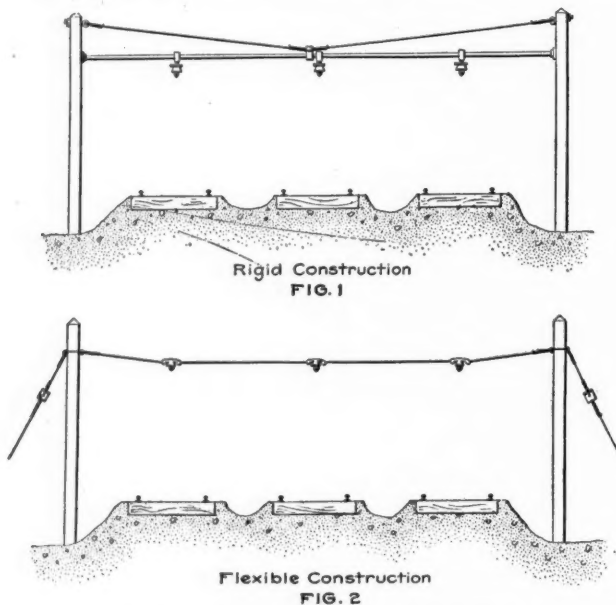
Let's all keep our mines safe this winter and help put the German back where he belongs.

IDEAS AND SUGGESTIONS

Flexible Trolley Construction for Mines

The more flexible or yielding overhead trolley construction is made, the longer will be the life of the trolley wire and wheels that operate on it. There are some conditions under which it is not feasible to install the trolley from flexible supports. Inside coal mines it is most convenient and economical to attach it to insulated hangers fastened rigidly to the roof or overhead timbers. Also lack of headroom in the mine often prevents the use of flexible construction.

Outside the mine there are no such limitations as underground, and it will be found usually that con-



FIGS. 1 AND 2. TROLLEY DESIGN FOR MINE WORK

siderable saving can be effected by suspending the trolley from a flexible cross-span wire. The common practice of continuing outside the same rigid construction that is used inside the mine shortens the life of wire and wheels and requires a large amount of material that could be saved. Great lengths of pipe have been used, some spanning four or five tracks, and quite low, in an endeavor to make the overhead rigid.

Fig. 1 shows an installation of the rigid type. Hangers are secured to cross pipes spaced about 30 ft. apart. There is a great weight of material to be supported. A better construction for such a condition is shown in Fig. 2. Light $\frac{3}{8}$ -in. soft steel cross-span wires take the place of the heavy pipes, hangers are snapped into the strand without cutting and the whole line is flexible, thus insuring maximum life of wheel and wire.

At 1800 lb. trolley tension, which is good practice, a 4-0 hard-drawn trolley wire supported every 30 ft. sags only about $\frac{1}{2}$ in.—*Ohio Brass Bulletin*.

Various Types of Pipe Hangers

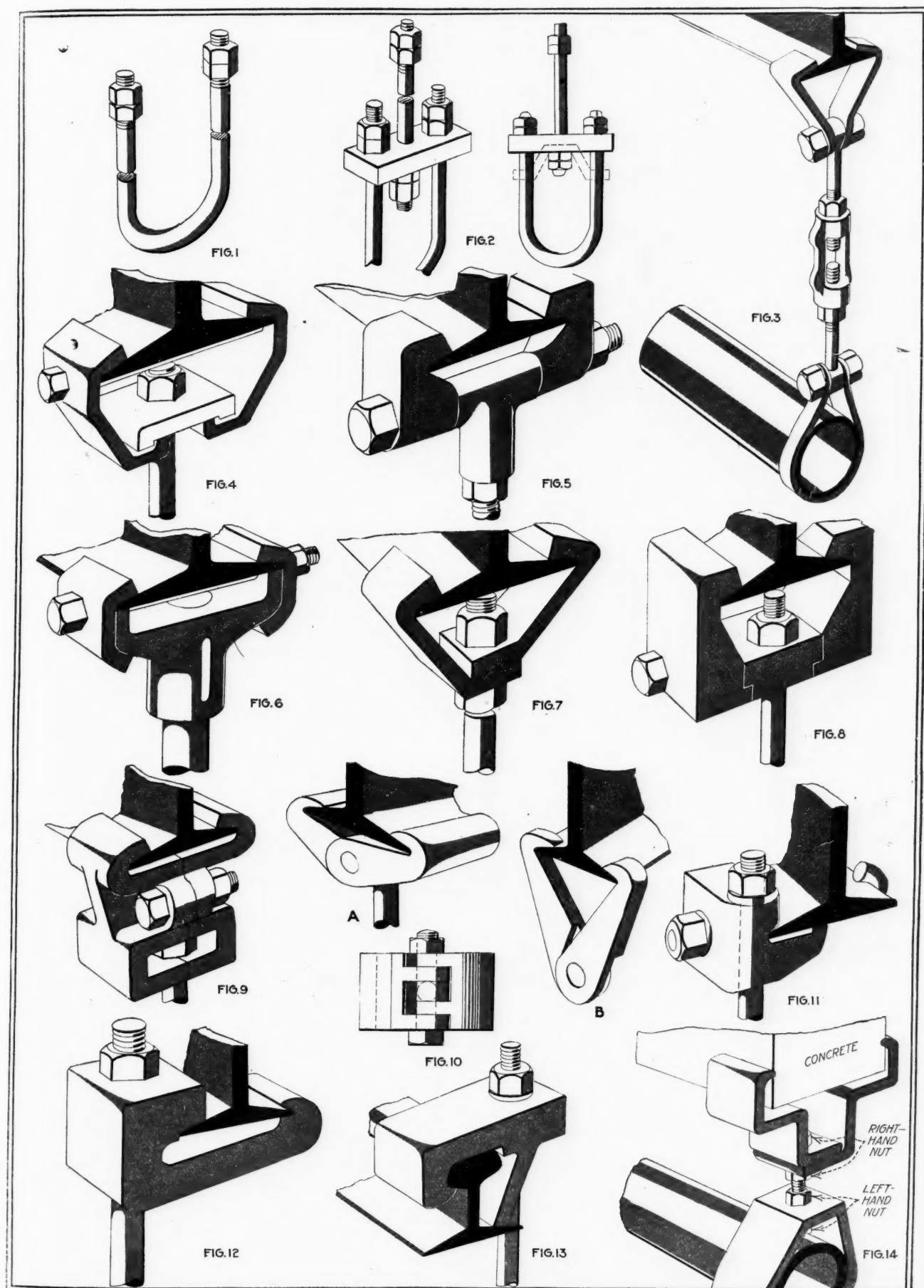
The common U-bolt, as shown in Fig. 1, on the facing page, forms about the simplest and cheapest pipe hanger when there exists a suitable structure overhead for attaching it. The rod should be threaded for a considerable distance on each end for adjustment, and for pipes subject to vibration, such as steam, exhaust, hydraulic-pressure lines, etc., there should be jam nuts or other form of nut locks. Where the distance to the joint of support is excessive, or the overhead structure favors attachment at a single joint, the pipe hanger in Fig. 2 is suitable. If a flat bar is used for the cross-beam, it should be bent as shown in dotted lines.

Fig. 3 illustrates a complete hanger with clamp suitable for attachment to the lower flange of an I-beam. The strap in which the pipe rests is made from a broad flat bar of wrought iron or steel, varying in thickness from $\frac{1}{2}$ in., or even less for very small pipes, to $\frac{3}{4}$ or $\frac{1}{2}$ in. for large pipes. A turnbuckle with locknuts provides a means for adjusting the length. The rod ends in the turnbuckle are upset to give the same strength at the rest of the thread as in the full section of the rod, and the whole forms a strong, slightly hanger suitable for nearly any location where minimum cost is not considered a matter of first importance.

A large percentage of the pipes in use at the present time are suspended from overhead beams, and Figs. 4 to 12 show a variety of clamps intended for this purpose. These are mostly designed to be made of steel castings or forgings. On lines subject to shocks, it is useless to attempt the determination of hanger dimensions by calculations of the dead weight to be carried. Only good judgment qualified by experience is of any use in this case, and about the only rule to be followed is the one that says, "When in doubt, make it stronger."

Fig. 10 is commonly made as shown at A. There is less stress upon both the pin and the clamps if made as shown at B. Fig. 13 represents a hanger on T-rails used for supporting heavy pipes in a tunnel with smaller pipes hung beneath them. In Fig. 14 a pipe is supported with an adjustable hanger by grooves formed in a concrete beam. The strength of the groove was found by experiment to be far in excess of that of the clamps, which were designed of ample proportions for the service required.

Large vertical pipes are usually supported from the bottom by means of a properly constructed special fitting provided with a base for resting upon a suitable foundation, preferably of masonry. Smaller ones may be suspended from above by rods connecting to a split collar placed beneath a convenient pair of flanges. Sometimes a vertical line is supported about midway of its length by a fitting made of a bracket form and bolted to the wall.



Courtesy American Machinist

FIGS. 1 to 14. ILLUSTRATING VARIOUS TYPES OF INTERIOR PIPE HANGERS

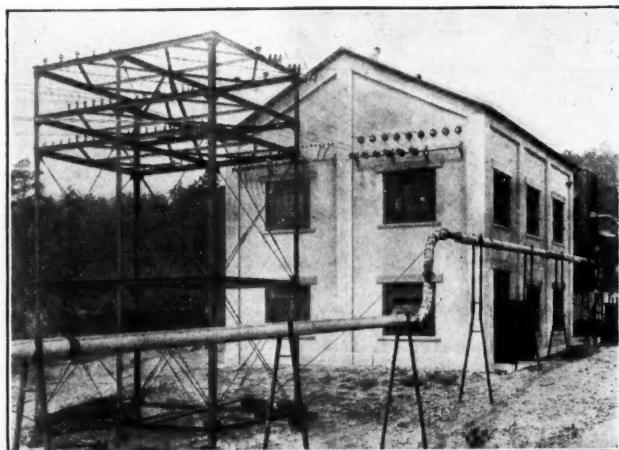


FIG. 1. SUBSTATION AT TAMAQUA COLLIERY

Modern Substations of Large Anthracite Distribution System

THE electrical equipment of some of the larger anthracite mining companies of Pennsylvania is the finishing touch to a development which has taken years to bring to its modern high state of efficiency. A number of the large companies in the anthracite field are committed, to a greater or less degree, to an electrical policy. Prominent among these is the Lehigh Coal and Navigation Co., whose main collieries are operating in the Panther Creek Valley, which is an eastern extension of the southern region of the anthracite field. Here, in a section $1\frac{1}{2}$ by 10 miles in area, is installed an 11,000-volt distribution system which includes 23 substations.

Among the larger substations is the one at the Tamaqua colliery, shown in Fig. 1, which is typical of all the substations of this class. These buildings are among the finest in the anthracite coal region—the most modern in construction as regard building and equipment. They are built of hollow tile, cemented over, inside and out; concrete is used for foundations and floors, and fireproof construction is further secured by the use of red asbestos protected metal roofing, made by the Aspromet Co., of Pittsburgh, Penn. The smaller substations are made with a wood frame covered with Hyrib outside and cement inside to keep down the fire risk.

The electrical development of the Lehigh Coal and Navigation Co. as regards distribution and substations is of the indoor type. As current is distributed at 11,000 volts, nothing would seem to be saved or gained by putting in expensive outdoor equipment, such as switches, transformers and so on. What would be saved in buildings would be expended on equipment of the outdoor class. On the other hand, in high voltages, G. M. Kennedy, electrical engineer of the company, advises that money be invested in outdoor equipment rather than in buildings.

Electrical power is generated at the Hauto power station—a 25,000-kw. installation located in the adjoining valley to the north of the Panther Creek. There are 11,000-volt tie lines connecting the main Hauto plant

with the substations. These lines are used in case of failure of any of the main transmission lines from Hauto and were not installed as tie lines, but were the original transmission lines from the old power house, which has been abandoned. Rather than discontinue these old lines it was found that with little expense they could be converted into tie lines which would connect the various substations with the power supply. The substations were built by the company, and all equipment was installed by the company's engineers. The iron work connected with the substations and lines was made at the Lansford shops of the company. The main transmission lines were owned by the Lehigh Navigation Electric Co.—the original power plant holding company—but now they have been taken over by the Lehigh Coal and Navigation Company.

The 11,000-volt transmission system to the various plants is shown in Fig. 2. This illustration was not taken from a scale drawing and merely shows the approximate relation of the more important substations to each other and to the Hauto power house. There are 23 substations in the Panther Creek Valley and four in the valley to the north. Some of the main substations and the horsepower of each are as follows: Lansford, 4200; Greenwood, 3240; Nesquehoning, 3160; Tamaqua, 2312; Hauto washery, 1100 and the North End pumping station, 700.

The type of larger substation is illustrated in Fig. 1; in which is shown a distributing tower and the wire connections to the building. The prominent steam pipe line shown in the illustration will have a limited life, for it supplies steam to an engine driving a fan which adjoins and is almost hidden by the substation; the fan will shortly be electrically driven and the steam line will be removed.

There are two 11,000-volt, three-phase and 25-cycle incoming lines from the Hauto plant to the substation; both lines are kept active supplying power to the bus, but in case of either line going out of service for any cause the entire load is carried on the other line. Each

of these lines is tested often enough to insure that both are capable of carrying current and are equipped with electrolytic, or aluminum cell, lightning arresters of Westinghouse manufacture. These arresters have disconnecting switches for the purpose of disconnecting the power to the arresters to enable making any repair or inspection of the arresters.

Continuing with the description of the course of the current through a substation, the process and equipment at substation No. 14, or Tamaqua, is typical and will be noted as an illustration. Here the lines pass through disconnecting apparatus and choke coils to oil circuit breakers and thence through disconnecting apparatus to 11,000-volt busbars. These busbars are composed of

Equipment is installed for a future bank of three (500 kv.-a. each) transformers, 11,000 to 2300 volts. Also a bank of three transformers, the required capacity of which is not definitely decided upon as yet. The equipment is also installed for an outgoing line from this bus to furnish power to outlying points at Tamaqua or other collieries in the vicinity. Connected at the end of this bus through disconnecting switches and proper fuses are two potential transformers (11,000 to 110 volts) for supplying potential to all voltmeters, wattmeters and power factor indicators in the substation.

The 2300-volt transformers mentioned above are used to furnish power to the 1200-hp. water hoist and also to the 375-hp. tender hoist. This is done by running

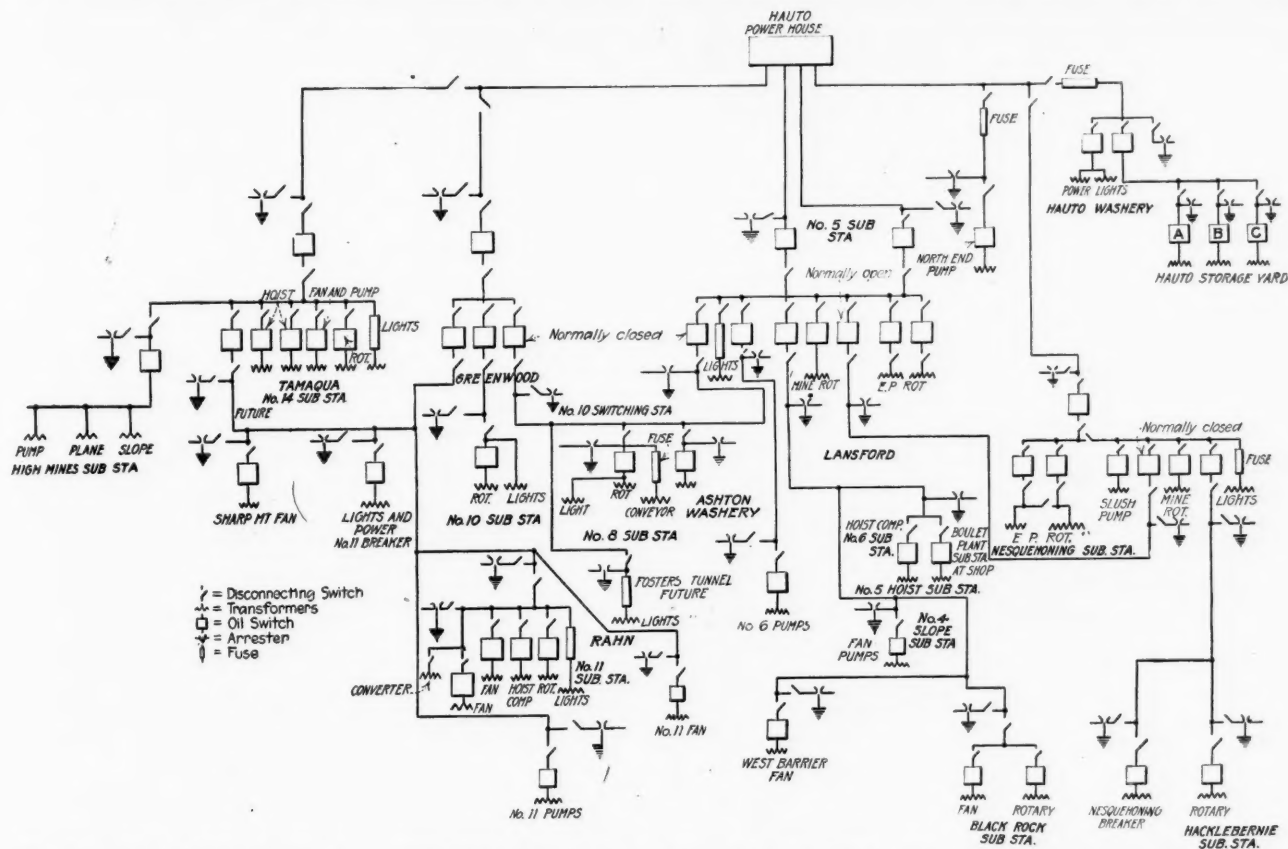


FIG. 2. PLAN OF 11,000-VOLT DISTRIBUTION SYSTEM FOR PLANTS OF LEHIGH COAL AND NAVIGATION COMPANY

copper tubing with an outside diameter of $\frac{15}{16}$ in. and an inside diameter of $\frac{11}{16}$ in. There are two sets of disconnecting switches, so that power can be cut off both sides of the oil circuit breakers to permit of making repairs and inspection. These incoming lines are equipped with necessary current transformers (Fig. 3), which are used in connection with the trip coils of oil circuit breakers and the instruments (ammeters and wattmeters) mounted on the switchboard. In the bus between the two incoming line connections and connections for feeders are mounted the current transformers used in connection with watt-hour-meters which measure the power delivered to the substation. From this bus are supplied, through the disconnecting switches and oil circuit breakers, a bank of three (500 kv.-a. each) oil-cooled transformers, 11,000 to 2300 volts, and a bank of three (110 kv.-a. each) oil-cooled transformers, 11,000 to 172 volts, all the transformers being of Allis-Chalmers manufacture.

secondary or 2300-volt lines from the transformers through suitable disconnecting switches and oil circuit breakers to a 2300-volt bus, from which taps are taken through disconnecting switches and oil circuit breakers to the lines, which extend to the hoists. Each hoist has its independent line and equipment.

The 172-volt transformers (noted above) are used to supply the alternating-current power to the rotary converter (Fig. 4). This is done by extending taps from transformers through disconnecting switches to three-pole, double-throw knife-switches, to the converter. The direct current is taken from the converter through a single-throw, single-pole knife-switch to a suitable carbon break circuit breaker to a 275-volt bus. From this bus a tap is taken through a carbon break circuit breaker to necessary switches to a feeder which extends down the shaft to furnish power to the haulage system, car hauls, transformers and so on.

The switchboard, which was furnished by the West-

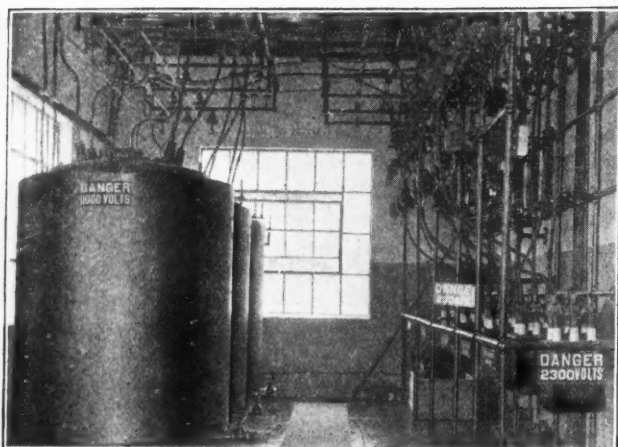


FIG. 3. THE TRANSFORMERS AND MODERN WIRING ARRANGEMENTS AT TAMAQUA SUBSTATION

inghouse Electric and Manufacturing Co., is made up in two sections—one of ten panels and the other of nine panels respectively. The nine-panel board is used to control panels Nos. 1 and 2, the two incoming lines; panels Nos. 3 and 4, the present bank of kilovolt-ampere transformers, 11,000-volt side and future bank of 500 kv.-a.; panels Nos. 5 and 6, control 2300-volt side of transformers; panel No. 7, controls power to water hoist; panel No. 8, controls power supply to a future coal hoist; and panel No. 9, controls power to the present tender hoist. There is a panel at the end of this nine-panel board which was installed by the power company, on which is mounted all metering equipment for measuring the power supplied to the substation.

The ten-panel switchboard is used to control panels Nos. 1 and 2, control 11,000-volt side of present rotary converter transformers and also future converter transformers; panel No. 3, controls the future high-tension side of 440-volt transformers; panels Nos. 4 and 5, to control future 440-volt equipment; panels Nos. 5 and 6, to control the 172-volt side of present and future rotary transformers as well as the alternating-current side of converters; panels Nos. 7 and 8, to control the direct-current side of present and future converters; and panels Nos. 9 and 10, to control the present direct-current feeder with the possibility of an additional feeder being installed at some future time.

In these substations, the copper tubing and pipe-

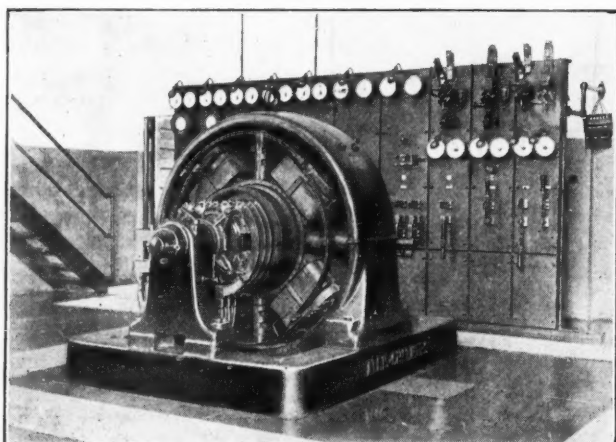


FIG. 4. ROTARY CONVERTER AND SWITCHBOARD AT TAMAQUA SUBSTATION

frame mounting of equipment permit of open construction whereby everything is accessible. It is only the low-tension wires which run in fiber conduits in the floor. The electrical machinery and apparatus were furnished by the leading manufacturers in these lines.

Direct-current rotary converters are used for supplying power for mine haulage, which includes 95 miles of trolley wire and 88 locomotives of various types and sizes. Alternating current is supplied to mine fans, pumps, hoists, air compressors and breaker machinery. Every breaker, pumping station, individual fan and hoist is metered so that information is obtainable as to the amount of power consumed by each individual class of equipment. All meters are read monthly and a close check is kept on the way power is used in haulage, pumping, ventilation and in the breakers. Thus the cost of power per ton of coal is distributed among the various items entering into the expense of production.

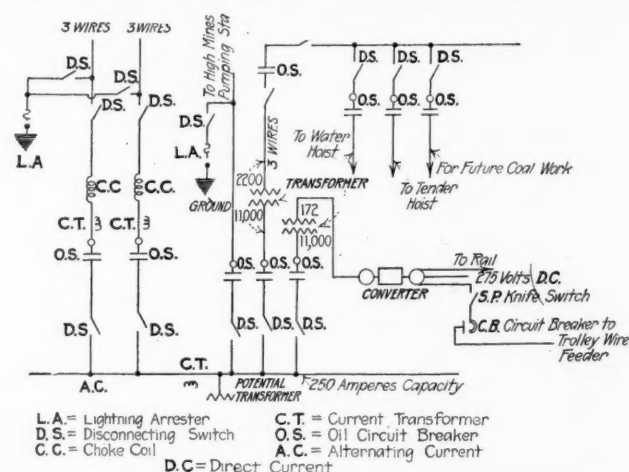


FIG. 5. WIRING DIAGRAM AT TAMAQUA SUBSTATION

When sufficient data have been secured to make the information reliable for reference under every condition likely to be met with in operation, valuable standards will be established. Leakage due to many causes encountered in practice then will be the more readily detected.

Gives \$300,000 for Engineering Research

Ambrose Swasey, of Cleveland, Ohio, has recently given the Engineering Foundation an additional \$100,000 for the endowment of engineering research. In 1915 he gave \$200,000 for this purpose, so that his total gifts are now \$300,000. Mr. Swasey's original gift made possible the establishment of the Engineering Foundation by the United Engineering Society, representing the American Society of Civil Engineers, American Institute of Mining Engineers, American Society of Mechanical Engineers and American Institute of Electrical Engineers.

Mr. Swasey is a past-president of the American Society of Mechanical Engineers and is well known as a designer and builder of large telescopes, other optical instruments and fine machine tools. His gifts have been inspired by his conviction as to the necessity for research in engineering sciences, in connection with the war, and in keeping the United States of America in the forefront of the nations in industrial development in the new peace era.

Research and Progress in Byproduct Coking in Great Britain—I

By J. B. C. KERSHAW

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SYNOPSIS—*The series of articles of which this is the first deals particularly with conditions in Great Britain. Much progress has been made, chiefly in heat control, but also in the recovery of various byproducts. Costs of byproduct recovery have likewise been somewhat reduced.*

AUG. 4, 1918, marked the entry of the European war upon its fifth year, and with no prospect of an early decision the demand for war materials and stores of all kinds is increasing month by month. Especially is this true in the case of explosives. For as the world struggle continues, the urgent call of the army and navy authorities in all countries engaged is for more and yet more explosives.

In an article published in *Coal Age* for Nov. 24, 1917, I gave a diagram showing the various products obtained in the byproduct coking industry, and the connection of this industry with the manufacture of explosives. Figures were also given showing the expansion of byproduct coking in the United Kingdom, in the years 1907 to 1915, the increase of the byproduct coke production during this period being from 18 to 50 per cent. of the total amount produced. The enormous demand for benzol and toluol for explosives manufacture has of course accelerated the movement in favor of byproduct coking both in the United States and the United Kingdom, and it is probable that over 60 per cent. of the coal coked in the latter country is now treated in byproduct ovens.

As regards America, the latest reliable figures show that the capacity of the byproduct coke ovens has doubled in the last three years, and that the output of light oils has increased from 7,500,000 gal. in 1914 to between 40,000,000 and 60,000,000 gal. in 1918, with a corresponding increase in the yield of toluol. The number of byproduct recovery ovens has increased from 6500 in 1915 to 12,000 in 1918 (when all the present building contracts are completed), and the carbonizing capacity of these ovens, which was 24,000,000 tons of coal per annum in 1915, is now said to be 60,000,000 tons.

In view of these striking figures proving the remarkably rapid growth of the byproduct coking industry, it is thought that some notes upon the recent work and progress in the United Kingdom may prove of value to American readers. American practice no doubt is ahead of English in the size of units and plants, in the use of mixed fuels, and in the higher temperatures employed in carbonization. On the other hand, English practice is superior to American in the completeness and more scientific control of the recovery processes. Coke-oven managers in each country therefore have something to learn from "over the water."

In the present series of articles the following sub-

jects will be dealt with: Modern theories of the carbonization process; the path of the coke-oven gases; modern coking practice in the United Kingdom and a comparison of early and modern practice; tar distillation plant and its problems; benzol recovery and distillation plant; the utilization of waste gases from coke-ovens; the future development of the industry.

A paper read last year before the Western Section of the newly formed British Coke-Oven Managers' Association by D. V. Hollingsworth discussed at considerable length the results of the latest research work upon the constitution and composition of coal, and the occurrences in coke-ovens during carbonization. Since coking practice in the past, both in Britain and America, has suffered from being founded entirely upon empirical rules and principles, the paper is worth the attention of all coke-oven managers and engineers.

Summarizing the research work carried out in recent years in the United Kingdom by Aitkin, Bedson, Lomax and Wheeler, the author stated that:

The microscopic work of Lomax, of Pendlebury, and Aitkin, of Glasgow, has clearly shown that the substance of coal may be divided into three main parts: (a) An opaque black substance (probably granular or amorphous). (b) A yellow or reddish substance (soluble in turpentine). (c) An earthy substance, like umber. These different parts are clearly distinguishable when coals are cut into very thin sections.

Professor Bedson, of Newcastle, has demonstrated that it is possible to divide coals into three parts by the use of different solvents. It has been found that one portion of coal is completely insoluble in pyridine; another portion is soluble in pyridine, but not in chloroform; while a third portion is soluble in both pyridine and chloroform. It is considered that the substance insoluble in pyridine represents stable humic matter, produced through the destruction of the cellulose portion of vegetation, and that the part soluble in both pyridine and chloroform is of a resinous nature, and results from the decay of the natural resin, well known to exist in living vegetation.

The report of the Home Office on "Coal-Dust Explosions" contains Wheeler's results of experiments on heating coal in various ways, whereby it is shown that coal contains at least two different classes of organic compounds, namely: (a) A part which breaks up at between 400 deg. and 700 deg. C., and yields principally paraffin hydrocarbons, but little hydrogen; and (b) a part which requires a temperature of above 700 deg. C. to effect its decomposition, and yields principally hydrogen.

It would therefore seem that there is a definite connection between the results of these experimenters, which together establish the opinion that coal is composed of at least two different types of substances. Further, it has been established that it is the resinous portion of coal which produces its caking or fusing properties, because on carbonization it first breaks up to a pitchy residue, which causes the particles of true coke to become agglomerated together. This resinous matter is easily oxidized by exposure to air, and when oxidized the coal will no longer produce an adhesive coke.

The author then discussed the effects of heat upon coal, and pointed out that the rapid changes which occur

in the coke ovens are somewhat analogous to the slow changes which Nature has produced in the past, during the conversion of dead and decaying vegetation into coal.

It must not be supposed that under the influence of heat coal breaks down straight away to the products which are drawn from the oven. Intermediate products of different degrees of complexity are formed, which suffer further decomposition, or maybe themselves react with each other to form new compounds. Nor must it be inferred that there is any accident about the formation of these substances. Without doubt the reactions occurring in the oven during carbonization of coal are all in accordance with well-known laws, and it should be the duty of those in charge of such processes to learn what these laws are, in order the better to control them.

The influence of the iron impurities present in coal upon the coking results was next dealt with, and the reason for the advantages gained by the removal of pyrites and the addition of lime to the fuel were scientifically explained. The effects of increased temperature upon the yields of gas, light oils and pitch, and of moisture upon the yield of ammonia, were also examined, and the figures contained in Tables I and II were given to illustrate this portion of the paper.

TABLE I. INFLUENCE OF TEMPERATURE UPON YIELDS OF GAS, LIGHT OILS AND PITCH (HOLLINGSWORTH)

Temperature, Deg. C.	Gas Made, Cu. Ft. per Ton	Light Oils from Tar, per Cent.	Pitch from Tar, per Cent.
500	6,600	19.67	28.89
600	7,200	16.51	33.80
700	8,900	8.20	41.80
900	10,162	0.445	64.08

TABLE II. INFLUENCE OF TEMPERATURE UPON YIELD OF AMMONIA (HOLLINGSWORTH)

Temperature, Deg. C.	Nitrogen in Coke	Nitrogen as Ammonia	Nitrogen in Gas	Nitrogen in Tar, Etc.
600	72.4	10.6	5.13	11.87
700	70.1	19.6	7.98	2.32
800	65.2	21.7	9.43	3.67
900	62.1	20.8	15.61	1.49

The paper concludes with some practical suggestions, and as these represent a combination of advanced English theory and practice, they may well be summarized:

1. The sulphur and ash in the fuel charged should be reduced to the lowest possible percentage, by careful picking and scientific control of the washing plant.
2. The moisture permitted to remain in the coal, after washing, should be as near 9 per cent. as possible.
3. The temperatures of the ovens should be raised or lowered *en masse*, and not individually; tampering with the heats as between one shift and another should not be permitted, and the effect of darkness in rendering more conspicuous the heat of the flues should be discounted.
4. The damper should not be adjusted by anyone save the plant manager, and the two extremes of damper position should be avoided. A too high damper means "loss" of heat in the chimney; a too low damper "smothering" the heat in the flues. The lowest damper position consistent with a clear atmosphere in the flues is the one to be aimed at, and a sufficiently well spread-out flame to prevent local heating of the ovens should be obtained.
5. The ovens should be filled with even level charges, and there should be no "humps" on the bench side of the compressed charge. A "make up" car of slack should never be omitted, as the vacant space caused by the falling of the front end of the cake leads to thermal decomposition of the evolved gases.

6. The ovens should be discharged in regular order, and to insure this regularity a chart should be devised allowing the maximum time between the discharge of adjacent ovens.

As regards the speed of the removal of the gaseous products, the author stated that this was one of the most important features of good management, and one that ought always to be under perfect control. He recommended therefore:

1. Regular and proper cooling of the gases, whereby the exhausters have a uniform bulk of gas to deal with.
2. Keeping thoroughly clean the ascension pipes and mains, and especially the valves. This last is insured by the use of a chart, indicating when valves were last dismantled and cleaned.
3. The use of properly acting main governors.
4. Proper leveling of the charge to prevent back pressure.
5. Keeping such a vacuum in the mains as will leave only slight pressure on the oven when at its maximum output.

Finally, he urged that for the more efficient and scientific control of the coking process some means of measuring the volume and testing the thermal value of the evolved gas was necessary; and for this purpose he recommended the installation of meters and recording gas calorimeters. With this combination of apparatus, the coke-oven manager would be warned at once when any departure from normal working had occurred, and he could then take whatever steps were necessary to restore the conditions that had been temporarily upset.

Another contribution to the theory of carbonization that is worthy the attention of American coke-oven managers is an article by G. E. Foxwell, which appeared in *The Gas World* of Dec. 1. 1917. In this the author cites experiments carried out by himself to prove that in coke ovens the path of travel of the evolved gases is not, as generally assumed, up the interior or center of the mass of half-coked fuel, but is up the outside of the charge. The gases therefore must come into intimate contact with the heated coke and with the walls of the oven; and as it is proved that heated brickwork has a catalytic action upon gases, and is therefore more effective in producing decomposition than radiant heat, the greater number of secondary reactions will occur in this outer area of the oven. The following paragraphs contain the gist of this important article:

The actual temperature at which a coal decomposes—that is, at which the primary products of distillation are evolved—is probably nearly the same (within narrow limits) for all coals and in all ovens. Differences in yield due to varying oven temperatures are simply caused by the different temperatures at which the gaseous products are "fixed." This "fixing" consists essentially in setting up a condition of equilibrium between the various gases present, and is brought about by contact with the red-hot coke and oven walls. There is probably an optimum temperature for the formation of each particular byproduct, and it is only by a careful experimental study of the reactions taking place in the coke oven that any real light can be thrown on the matter.

These considerations open the way to a further wide field for research. The writer has shown that the products of distillation come in contact with the oven walls, and that hence the temperature to which they are subjected is under control. It has been mentioned that heated firebrick exerts a catalytic influence on the gases evolved. It follows, therefore, that if found advantageous the catalytic influence

may also be brought under control. Thus there may be found to be a radical difference between the products formed and yields obtained when the walls are made of silica bricks, as compared with those obtained with fire-clay bricks. Again, lime-bound silica bricks may give results which differ from clay-bound silica bricks. Bauxite, magnesite, etc., are all worthy of trial. Further, by treating the bricks with small quantities of the rarer oxides, metals, etc., the ammonia yield may be increased and the character of the tar modified.

It may also be noted that this has an influence on the salt problem, for since most of the gases come in contact with the wall of the coke oven, practically the whole of the salt volatilized during the coking of the coal will also come in contact with the walls. On this theory it is readily understandable why such a relatively small amount of salt is able to cause so much corrosion.

MODERN COKING PRACTICE IN ENGLAND, AND A COMPARISON OF MODERN AND EARLY METHODS

The coke-oven byproduct plant erected at Marley Hill, County Durham, for John Bowes & Co. is typical of the modern English coking plant, and may therefore be described before contrasting modern with early methods. The plant is supplied with coal from the surrounding collieries in a fine state of subdivision (95 per cent. of the deliveries passing through a $\frac{1}{2}$ -in. screen and 60 per cent. through a $\frac{3}{4}$ -in. screen) and containing 15 per cent. dirt.

The coal as received is first passed through a Blackett washery, by which the dirt content is reduced to about 3 per cent., and the washed and drained coal is then compressed and charged into the ovens in the usual manner. The coke produced is of average quality and contains about 8 per cent. ash. The gas is conveyed from the ovens by cast-iron pipes and is passed through air and water coolers, and the tar removed before passing through the exhausters.

The compression it here receives raises the temperature, and the gas is passed through another cooling tower before reaching the scrubbers which remove ammonia and benzol. A portion of the scrubbed gas is of course used for heating the ovens, but the surplus gas and waste heat is employed to generate steam, which is used in the coking and byproduct plants and also for operating a 600-kw. turbo-generator, by aid of which all the mechanical work of the coking and recovery plant is carried out.

The ammoniacal liquor obtained from the first scrubbers is used to produce gray sulphate of ammonia by the Wilton process, or to produce a concentrated ammonia liquor of any desired strength by the Diamond process. The benzol recovered from the gas by the usual method of washing with creosote oil is treated in the special distillation portion of the recovery plant, and separated into 90 per cent. benzol, 90 per cent. toluol and 90 per cent. solvent naphtha.

The naphthalene is conveyed to the tar distillery and is treated with the tar produced from the coking plant in four pot-type tar stills, in order to separate the naphtha, creosote, naphthalene and anthracene from the residue of pitch. A sulphuric acid plant of the Moritz type is now being erected in order to complete this well-equipped byproduct coke-oven plant.

W. Diamond, who is the manager of this plant, is also chairman of the Northern Section of the Coke-Oven Managers' Association, and in a paper read before a recent meeting of the members he contrasted early

and modern methods of coking in this district. The tar produced in gas manufacture 25 years ago, from the same coals used today, was quite different in character, both physically and chemically, being more fluid and richer in naphtha and phenols, while the pitch did not contain so much free carbon.

Today, the tar produced by the higher heats generally used consists chiefly of naphthalene, with a little anthracene oil and pitch. The higher temperatures also lead to some decomposition or cracking of the benzol and other light oils before they leave the retorts or ovens. Comparing the yields of ammonia, he had not noted so much difference between the results of the past and present. The coke produced, however, by the lower temperatures used for carbonizing in the past, was much larger in size, was tougher, and produced considerably less breeze. Summarizing these results we have the following contrast:

To sum up all these results, we produced in the first case a coke having better physical properties, consequently we produced more benzol, more tar, and the same proportion of ammonia, but one-sixth less volume of gas. In order to produce the same quantities of these, our oven installations would require to be one-third larger. This would mean a considerably increased capital charge, while the only profit to compensate us would be on the benzol, tar and ammonia.

There is one other drawback to low-temperature distillation, and that is in the quality of the benzol produced. It is common knowledge that when coal is distilled with lower temperatures large yields have been found and classified as benzols, but have turned out to contain considerable quantities of paraffins—so much so, that for some purposes the paraffins have spoiled the toluol to a certain extent, by making it most difficult, and not at all profitable, to manipulate chemically.

Another authority upon English coke-oven practice, G. Blake Walker, has recently contributed a paper to the Institute of Civil Engineers upon "Recent Developments in Byproduct Coking," which is worth attention. The author states that since his paper of 1900, a complete revolution has occurred in English coking practice and that no ovens of the beehive type are now being built. The three most noticeable improvements in modern plants are: (1) Better distribution and heating of the combustible gases, so as to insure a more equal temperature in all parts of the oven walls. (2) Separate supply of air for combustion to all the numerous burners. (3) "Direct" recovery of sulphate of ammonia.

After referring to the use of the surplus gas for various heat and power purposes, and to the great importance of the benzol, tar and ammonia since the war had cut off our supplies of German dyes, drugs and fertilizers, the author pointed out that the objects to which all recent improvements are directed are the following: (1) More intense and better equalization of heat in all parts of the oven walls, in order to burn off the charge more quickly and uniformly. (2) Equalization of the pressure of the gas between the ovens and the heating flues. (3) Reduction in the time of coking, whereby a larger output of surplus gas, coke and byproducts is obtained from a given number of ovens, and reduction in the cost of coke making, etc. (4) Good means of inspection of the heating flues. (5) Facility of regulation. (6) Increased yield of ammonia and benzol. (7) Reduction of quantity of gas required for heating the ovens, by the use of regenerators.

The paper closes with an analysis and comparison of the costs of operating the direct, semi-direct and indirect processes of ammonia and benzol recovery, based on figures given in recent contributions by Christopher and Heck. Although these figures are drawn from entirely different sources and relate, the first set to English, and the second set to German practice, they show fairly concordant results which may be summarized as follows:

COMPARATIVE COST OF AMMONIA AND BENZOL RECOVERY BY VARIOUS SYSTEMS, IN PER CENT.

	Old System	Semi-Direct System	Direct System
English results.....	157	108	100
German results.....	131	114	100

The direct system of recovery is therefore far more economical than the old indirect or semi-direct system, but, as the author points out, the costs will differ in nearly every case, owing to local circumstances, the efficiency of operation of the plant, and the proportion of gas being treated.

(To be continued)

Diamond Drilling Near Chemainus, B. C.

New coal-mine development of an important character has commenced on Vancouver Island, British Columbia. The measures known to exist on the East Coast near the town of Chemainus are being explored by means of diamond drill, and those in the best position to hazard a forecast do not hesitate to predict that the results will be satisfactory as far as the quality and quantity of the coal, the existence of which is to be definitely established, is concerned. H. W. Treat, of Seattle, Wash., is the party best known in connection with these steps to develop this latent natural resource, but, according to newspaper statements and common report, he has behind him the capital of the Samuel Hill interests of the United States. If this is so it is generally believed that the coal industry of this section is likely, in the near future, to experience a very material growth.

The drills in question are being sunk near the foreshore at Chemainus, at which point Mr. Treat has secured some Provincial leases and options on some Crown Granted Lands. Incidentally, Mr. Treat, whose energies have been devoted to the Island for some months, has obtained options on other coal-bearing lands of the district. But in this particular section the drilling is being pushed forward expeditiously under the supervision of John Hamilton, who had charge of similar work for the Granby Consolidated Mining and Smelting Co. when that company was opening its coal mines at Cassidy's, Vancouver Island. The prospects for the establishment of another large colliery in this part of British Columbia, therefore, are bright, and residents are looking forward to it with gratification.

An account of what led up to the present situation is interesting. When the Esquimalt & Nanaimo Railway Co. obtained its land grant as a subsidy for the construction of the road, the Dominion Government, besides giving it all the mineral rights within the limits of the belt with the exception of that of gold and silver, also gave it the right to mine "in and under the seas." The Government, however, was doubt-

ful, apparently, as to whether it had the power to extend any such exclusive privilege to any company or individual. For that reason, the qualification was inserted that this applied only if Parliament had the authority necessary under the British North America Act.

This was the position when Mr. Treat and his associates cast their eyes on the East Coast foreshores of Vancouver Island and visualized the immense deposits of coal which lay beneath the protected waters of its bays and estuaries. With the demand for coal the world over increasing, and the price soaring, it was decided that the point as to whether these rights were open or whether they were the exclusive property of any one company by virtue of Act of Parliament should be brought to an issue. As was anticipated, no doubt, the plans of Mr. Treat had not proceeded far before legal proceedings were instituted, and since then, up to a short time ago, the matter has been before the courts of the land.

The result, as may be judged by the fact that development operations are proceeding, was that the position that the Esquimalt & Nanaimo Railway Co. cannot claim exclusive foreshore privileges has been upheld, although it is not improbable that the litigation will be carried as far as the Privy Council, as the dispute is one of the highest importance, involving title, if the opinion of geologists is to be given any credence, to considerable coal deposits. It is possible to get some idea of the coal wealth of the foreshores of the east coast of Vancouver Island, from Cowichan Bay to Nanaimo, a distance of between forty and fifty miles, and even further north, by contemplating the property of the Canadian Western Fuel Co. at Nanaimo, and its production. This company's chief output comes from No. 1 Mine, and its workings are under water. It acquired title to this, before the railway company got its land grant, from the Hudson's Bay Co., which, of course, was the pioneer in the opening up of Western Canada, as it was in the exploitation of the natural wealth of the whole of the Dominion of Canada.

Ventilation After Mine Explosion

In the event of the ventilating fan or appliances having been injured, wrecked, or destroyed by the force of an explosion immediate attention should be given to the repairs necessary for reestablishing the ventilating current. In a drift or slope mine, advantage should be taken of any natural ventilation that has become established. In a shaft mine advantage should be taken of any natural ventilation in exploring on the intake current, especially on ladders and stairways in any shaft through which such natural ventilation is supplying fresh air. Men may be found alive on the stairways. To aid natural ventilation or to establish a current of air in the absence of such ventilation, a spray of water may be directed down one of the shafts to cool the air and cause the shaft to become an intake. On the upcast air compartment a steam jet may be installed to heat the air. The jet should always be placed in the compartment of the shaft in which there are steam pipes, as the heat from the pipes will assist in warming the air and help to make an uptake current.—*Rescue and Recovery Operations in Mines.*

Increasing Coal Mine Efficiency—IV

BY CHARLES E. STUART

United States Fuel Administration, Washington, D. C.

SYNOPSIS—*This article is devoted to the efficient electrification of a coal mine using purchased power. In many cases, aside from securing current at a less cost per unit than that for which it can be generated, purchasing current has the advantage of putting its cost visibly on the cost sheet. Care exercised in changing over from one source of energy to the other is care well spent, as many economies can usually be made.*

WHILE central station power is not available at the present time in many coal fields except through increasing the demands on stations already connected up, there are other coal fields where there is a considerable surplus of capacity. In either case I believe that the following description will be of some value. It may offer suggestions to mines now fairly well equipped. It should certainly prove timely to operations that are increasing their equipment or electrifying new developments.

Considerably over half of the coal produced today is mined with the aid of purchased power. Take the Pocahontas fields of West Virginia, for example. The Appalachian Power Co. began to cover this field with its transmission system in 1911. Today half of the coal of the field is mined with power from this source; another 20 per cent. is mined with power generated in the central station of the United States Coal and Coke Co.

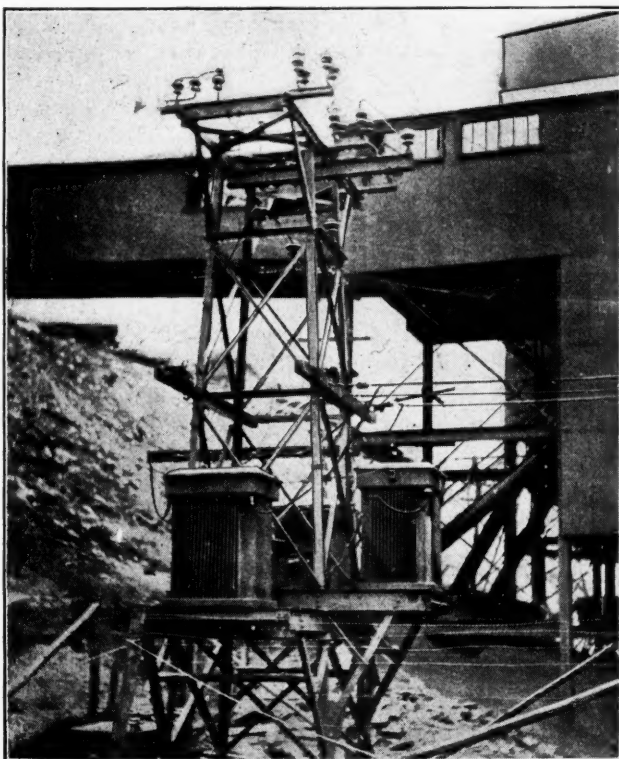


FIG. 25. TYPE OF TRANSFORMER STRUCTURE EMPLOYED

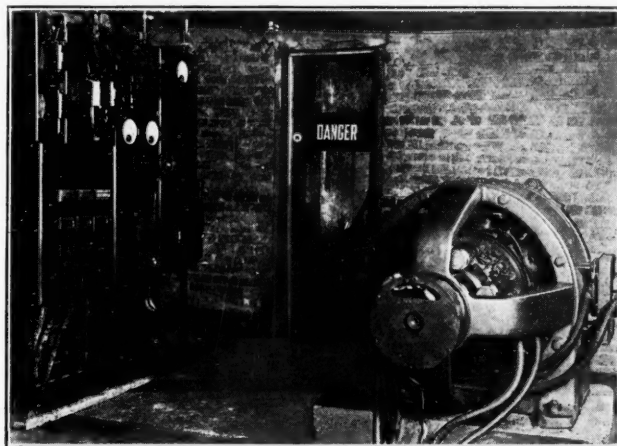


FIG. 26. ROTARY CONVERTER IN UNDERGROUND SUBSTATION

The remaining 30 per cent. is mined with the aid of isolated plants, nearly all of which were installed prior to the development of the system of the Appalachian Power Company.

The considerations in favor of purchased as against manufactured power may be briefly stated as follows: The elimination of the supervision necessary to properly operate and maintain a power station; elimination of skilled and semi-skilled labor, such as engineers and firemen, and the conservation of fuel attendant upon purchased power. A series of tests in the Pocahontas coal field (and these tests represent a pretty fair average) show that 11.6 lb. of coal are consumed for each kilowatt-hour generated. A central station making power in that field will operate at about 2½ lb. of coal per kilowatt-hour. A saving of approximately 9 lb. of coal for each kilowatt-hour used, or an average of 9.1 lb. of coal for each ton mined is thus possible.

In the anthracite fields of Pennsylvania, the estimate of coal consumed per kilowatt-hour is 16 to 17 lb. In this case, and for the purpose of the estimate, steam used for fan drive, pumps, etc., has been converted into the electrical unit. In fact, it is estimated in the anthracite field that a production of 90,000,000 tons of coal represents at least 9,000,000 tons of coal burned to produce power for this tonnage output. Central station electrification of this field would mean a saving of approximately 8,000,000 tons as now required in the production of energy for mining.

A summary of comparison made in the Pocahontas coal field shows 3 kw.-hr. consumed per ton of coal produced for purchased power and 5.8 kw.-hr. consumption per ton for manufactured power. This saving is the result of the elimination of line losses through placing the converting stations at the load center, by utilizing two-speed fan motors and by the practice of economy which invariably follows where the direct relationship between power consumption and monthly cost can be observed.

With purchased power it is possible to use alternating current motors for nearly all stationary-motor

work. These motors are extremely reliable, and they require little or no attention except occasional oiling of the bearings. They represent the ideal stationary motor for the mine, being as nearly foolproof in construction as it is possible to build. As a rule purchased power is less costly than manufactured power. This, however, is not always the case. There are numerous varying factors governing this consideration.

Before going into a description of a specific installation it should be stated that it was the intention of the mine owner, the engineer and of the power company to spare no reasonable expense in order to make this installation efficient. I will first give a general description of the layout of the plant before purchasing power, and then show just what methods were adopted for the use of purchased energy.

The main power plant consisted of two 150-kw., 275-volt, direct-current General Electric generators direct connected to Harrisburg slide valve engines. From the main power plant distributing lines were run out at 250 volts direct current, to supply the mine, fan, tippie, pumps, shops, lights and miscellaneous power used. The greatest distance from the power plant to the back of the lease was approximately 3 miles. This necessitated the use of heavy copper extending into the mine $2\frac{1}{2}$ miles. Even then the voltage on the 250-volt circuit well back in the mine was as low as 150 volts with heavy pulling.

The fan was located at the drift mouth, 1500 yd. from the main power plant and was supplied over a 2/0 circuit. The voltage delivered at the fan motor was as low as 200 when the load was pulling heavy. The fan was driven by a 75-kw. Westinghouse direct-current generator running as a motor.

The tippie was driven by ten motors aggregating 335 hp., varying in size from 75 hp. to $7\frac{1}{2}$ hp. and controlled from three different points on different landings. As all of this apparatus was operated by one man it was necessary for him to go from place to place in starting up the tippie and to climb up and down many steps. All wiring was of the open type run on knobs and through tubes, while in many cases it lay on steel girders. Tests were made on each motor separately in order to see if any power demand could be eliminated. While these tests showed that in several cases machines were over-horsepowered, still it was deemed advisable on account of the cold weather conditions not to change



FIG. 27. TRANSFORMERS EMPLOYED UNDERGROUND

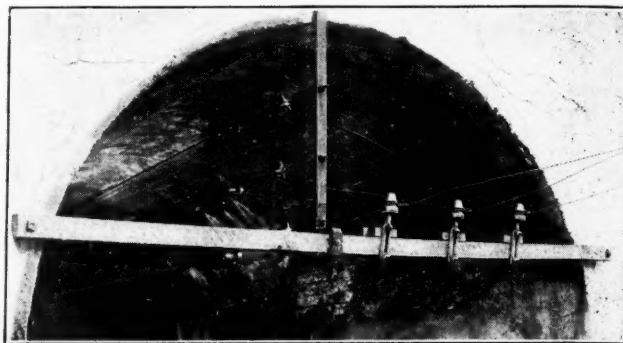


FIG. 28. METHOD OF SUSPENDING ELECTRIC LINE IN THE AIR COURSE

any of the sizes of the motors. The lowest potential recorded during this test was 200 volts. The tippie was fed by two 4/0 circuits.

The deep well pump was driven by a 10-hp., 250-volt, direct-current motor and was supplied from the circuit feeding the tippie, being about 100 ft. therefrom. The speed of this motor was varied by means of resistance, and in this way it was possible to pump just enough water to meet the requirements, without continually overflowing the tanks.

The machine shop was driven by a 10-hp., 250-volt, direct-current motor driving line shafting from which the various machines such as air compressor, lathe, drill press, boring machine and the like, were driven.

The lights were fed from a three-wire circuit, controlled by three single-pole knife switches, using the middle wire as a common return for the two outside wires, and maintaining a day and night circuit. Thus, by pulling one of the outside switches, the night circuit could be killed, or, vice versa, the day circuit could be switched on. All miscellaneous power such as refrigerator, motor for store, general manager's house, meat choppers, etc., were supplied from the day circuit.

NEW EQUIPMENT FOR PURCHASED POWER

I will now give a brief description of the general layout adopted. As shown at the beginning, the losses were considerable by the time the current reached to the most remote point in the mine from the main power plant. In order to keep the losses at a minimum, it was decided that two substations should be installed, one in the existing power plant and one inside the mine. A description of each is given separately under "Outside Substation" and "Inside Substation," later on in this article. In order to meet the situation most effectively it was decided to adopt two different voltages—that is, to install two banks of transformers. The type of transformer structures used is shown in Fig. 25. In describing the transformer stations I will designate them as bank No. 1 and bank No. 2.

Bank No. 1 consists of three, 100-kv.-a. 13,200/440-volt transformers located approximately 50 ft. from the tippie. From the secondary buses of these transformers a three-phase, 440-volt line runs to a main feeder panel in the tippie, and three of the two-circuit 4/0 feeder wires leading from the main power plant to the tippie were converted into a three-phase, 440-volt circuit leading to the outside substation located in the main power plant. The current is measured on the secondary side of the transformers, the coal company having a check

meter installed, as well as a meter on tipple circuit and pump, outside substation and lights and shop, thereby giving a correct proportion of the power chargeable to each installation.

Bank No. 2 consists of three 75 kv.-a., 13,200/2300-volt transformers located at the drift mouth. From the secondary buses of these transformers a 2300-volt, three-phase line runs into the fanhouse, tapping a three-phase bus, from which a circuit is fed through 2300-volt disconnecting switches to the fan and through 2300-volt disconnecting switches and a 2300-volt time-limit, overload, no-voltage release oil switch to the line running to the inside substation. The current is measured from buses in the fanhouse, the coal company having a check meter, as well as a meter on the fan circuit.

Outside Substation—The outside substation consists of a 150-kw., 250-volt, direct-current, six-phase, 1200-r.p.m., Westinghouse rotary converter with three single-phase transformers from 440 to rotary voltage, and a switchboard containing all necessary starting and control apparatus, also one automatic reclosing direct-current circuit breaker, thereby eliminating a constant attendant in the substation. In addition to the direct-current feeder for the mine circuit, there is a separate direct-current feeder for the larry circuit and boom hoist located in the tipple and controlled through circuit breakers and single-pole knife switches. A direct-current meter was installed on the larry circuit showing the kilowatt-hour consumption of the larry.

DESCRIPTION OF INSIDE SUBSTATION

Inside Substation—Before describing the electrical apparatus for the inside substation, I should like to give a brief description of the location and character of the room built to house the necessary apparatus. After having selected the space for this substation, which was in a breakthrough between air course and main entry, it was necessary to remove a considerable amount of coal and slate in order to get sufficient space for the installation.

The apparatus is installed with a view to being able to move any part without interfering with any other. For instance, it is possible to move the rotary, switchboard or any of the transformers without conflicting with either of the other two. The walls are built of brick, being as thick as the width of a brick on the side walls and the length of a brick on end walls. Next to the main entry a double door of sufficient size was installed to enable removal or replacement of any of the apparatus, and a single door opens into the breakthrough leading into the air course. By means of ventilators located in both doors, it is possible to regulate the amount of air flowing, and in this way the substation is kept cool at all times. From the roof the slate was taken down as far as the sandstone top, and left in this condition. This has thus far given satisfaction, and from all appearances will continue to do so.

The apparatus for this substation consists of a 150-kw., 250-volt, direct-current, six-phase, 1200-r.p.m., General Electric rotary converter, with three single-phase transformers stepping the voltage down from 2300 to rotary voltage, and a switchboard containing all necessary starting and control apparatus, also one automatic reclosing direct-current circuit breaker. The inside substation apparatus is shown in Figs. 26 and 27.

When it was decided to install this substation in the mine, estimates were made in order to ascertain if it would be more feasible to put a borehole down through the mountain or run a line through the air course. It was finally decided to adopt the latter. Accordingly a three-phase, 2300-volt line was constructed and run through the air course. The type of construction is shown in Fig. 28. Some anxiety was felt as to how this line would hold up on account of slate falls, but a careful inspection of the air course was made and all loose slate or any that was thought likely to fall was taken down.

This line has been in operation now practically a year and there have been only two interruptions; and these were not of a serious nature. The oil switch located in the fanhouse kicked out, but when closed again the line showed clear. It is therefore believed that small pieces of slate fell, causing a momentary short-circuit. The

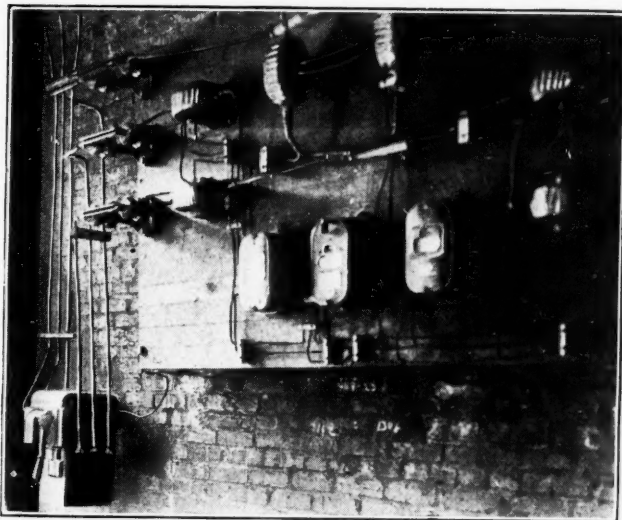


FIG. 29. OIL AND DISCONNECTING SWITCHES IN THE FAN HOUSE

oil switch located in the fanhouse, with disconnecting switches and other apparatus, is shown in Fig. 29.

In place of the 75-kw. generator operating the fan a 100-hp., two-speed, 2300-volt Allis-Chalmers induction motor was installed together with a starting compensator, pole-changing switch, and two sets of overload and no voltage releases, these being of the two-coil type, one to operate on high speed and one to operate on low speed, thereby guaranteeing safety from overloads on both operations. As stated before, there is a separate meter on the fan circuit showing the exact kilowatt-hours chargeable to ventilation.

Special attention is called to the method of control adopted for the tipple. This is shown in Fig. 30. The operator, a one-armed man, has all of his control apparatus located at one central point and arranged so that he can start each machine in its proper order. All wires for the tipple motors were figured and installed of sufficient capacity so that the total drop from the secondary buses of the transformers to the motor would not exceed 5 per cent. All wiring was run in conduit with proper condulets installed on each outlet. Practically all motors were of the slip-ring type, thereby taking care of the heavy starting load, which was a source of nuisance with the direct-current motors, especially in cold weather.

A 10-hp., 440-volt, two-speed induction motor was installed to handle the pump load, thereby enabling a two-speed operation in order to meet the condition, as desired, for this service. A separate meter was installed on this circuit in order to obtain the amount of power chargeable to water supply. A 10-hp., 440-volt induction motor was installed in the shop, driving line shafting to which all operating machines were connected.

The three-wire, 250-volt, direct-current circuit was converted into a three-phase, 440-volt circuit, the two outside legs of this circuit being controlled through circuit breakers and the middle leg through a single-pole knife switch. From this three-phase circuit leading out of the substation 440/110-volt transformers were installed to take care of the lighting and miscellaneous power. These transformers were so located that no secondary lines from the transformers would exceed 500 ft. in length using No. 8 wire for secondaries. There are two single-phase meters installed back of the switchboard on the three-phase, 440-volt circuit for measuring the kilowatt-hours chargeable to lights and miscellaneous power.

The accompanying figures for purchased power are based on actual records up to June of 1918. The figures for manufactured power are based on 1914 records, allowing for the increase of costs, as incident to present conditions. These figures show a reduction in power cost; also, a reduction in kilowatt-hours consumed. The mine fan, due to the delay in arrival of certain control parts, has never been operated at half speed.

Certain special considerations incident to the application of purchased power arise and require determination. Among these is the question of selection of motor-generator set or rotary converter. Within the last five or six years the 60-cycle rotary converter has been brought to a state of construction perfection where it is one of the most satisfactory and reliable pieces of

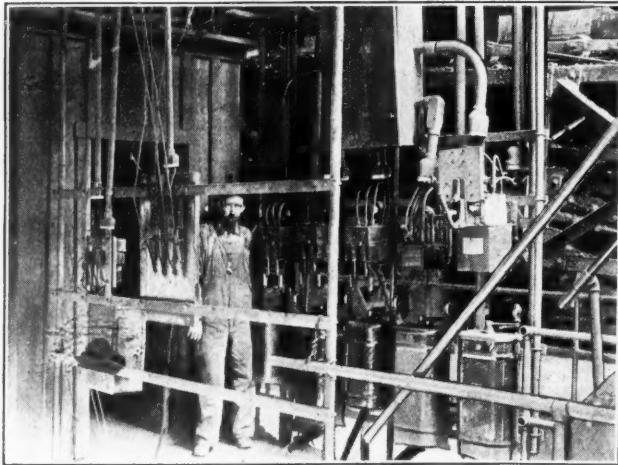


FIG. 30. GROUPED CONTROL APPARATUS IN THE TIPPLE

conversion equipment that can be obtained. This is true whether the case in question is one of operating a single-unit substation, the parallel operation of units in the same substation, or of parallel operation of two or more substations located at different points.

The rotary converter will carry a remarkably heavy overload without flashing. In fact it will readily carry from 100 to 200 per cent. overload on peaks of short duration such as are characteristic of the mine load.

Moreover, the operating efficiency is much greater than that of the motor-generator set. Difference in efficiency becomes more pronounced when considered with respect to the low load factor which is characteristic of the mine load. Fig. 31 is designed to compare the efficiency of a 200-kw. motor-generator set with that of a 200-kw. rotary and of a 150-kw. rotary. This particular com-

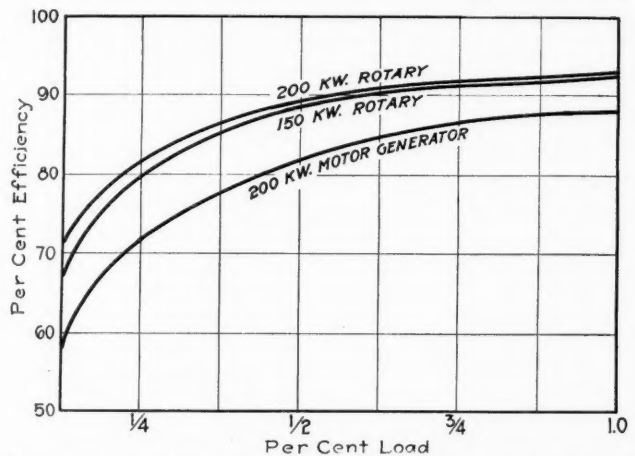


FIG. 31. COMPARATIVE EFFICIENCIES OF TWO ROTARIES AND MOTOR GENERATOR

parison was made for a mine which was using a motor-generator set, but increasing its substation capacity.

Based on the monthly output of the motor-generator set over a period of five months, it was determined that by the installation of a rotary converter and assuming a power cost of 1c. per kw.-hr., the 200-kw. rotary, if substituted, would save \$628 per year. The changeover was made in the case referred to, although the motor-generator set had at the time been in opera-

MANUFACTURED POWER (COST)

Power Consumption, 859,209 Kw.-Hr.	Tons Mined, 215,457
Coal 2761 tons @ \$2.40	\$6,526.40
Engine repairs	807.00
Generator repairs	36.34
Boiler repairs	530.00
Sundry tools	79.74
Supplies from store	58.10
Cost for ash disposal	109.32
Fire insurance and workmen's compensation	420.20
Firemen and engineers	5,047.00
Repairs—labor	518.29
Total	\$14,457.39
Superintendence	2,000.00
Depreciation	844.12
Total	\$17,301.51
Cost per kw.-hr.	\$0.02013
Kw.-hr. per ton mined	4
Cost per ton mined	\$0.08052

PURCHASED POWER (COST)

Tons mined	233,460
Purchased power (822,660 kw.-hr.)	\$9,876.00
Repairs to substations	196.56
Supplies from store	19.92
Substation attendant	282.00
Fire insurance and workmen's compensation	125.28
Superintendence	2,160.00
Depreciation	844.08
Total	\$13,503.84
Cost per kw.-hr.	\$0.01641
Kw.-hr. per ton mined	2.84
Cost per ton mined	\$0.05660

tion through a period of about two years only. The results have been as anticipated.

Rotaries of the same rating as the motor-generator sets replaced have shown themselves to be of relatively greater capacity. Likewise they have shown equally as great reliability in service. I do not recommend the rotary under all circumstances; however, where the system from which the supply of power is obtained is a modern one, there is little or no exception.

(To be concluded)

Who's Who In Coal Mining

Charles E. Stuart

Efficiency is a product of spirit, mind and matter. While James B. Neale masters the spiritual forces of efficiency and production, he puts the two latter in the hands of his lieutenant, Charles E. Stuart, who, before his work is done, will give the operators many new ideas as to how they may avoid waste of effort and current, and who concurrently will deliver again preachments they have heard before, but which they have contrived to forget and let slide in the press of business.

Mine operators are of many types. Some having been bookkeepers are interested in the accounting department of the industry, others having been lawyers are absorbed in the legal matters connected with it, others having been salesmen regard coal as something



CHARLES E. STUART

to sell, others being practical men think of coal as something to be hustled. Charles Edward Stuart, member of the Production Committee, regards it as a material to be cut, hauled and handled mechanically and on the economic cutting, hauling and handling of it he has expended much constructive thought.

This view of the industry he is pressing on the operator. A mine owner without a mechanical bent will overlook the mechanical needs of his plant. When asked if he is losing power, he is likely to reply that what he does know is that a pump is needed in Fourth Right. He is apt to think he wants more plant when he needs merely to run what plant he has more efficiently. He evades his mechanical problems because he does not understand them and because they are not his hobby.

Mr. Stuart is on the committee to bring the mind of the operator who is not mechanically inclined gently but steadily back to those problems he has persistently and instinctively evaded. And Mr. Stuart, as our

readers know from his articles on "Increasing Coal Mine Efficiency," now running in *Coal Age*, understands just where the operator without mechanical instincts is prone to slip up—or down.

Charles E. Stuart was born at Alexandria, Va., on Aug. 29, 1881, the son of Charles Edward and Ruth Yeaton Stuart. His father and maternal grandfather were both legal lights, the first being a judge in his home state, and the second, Gabriel Max DuVal, being a justice of the Supreme Court.

With all his inherited leaning toward the law, which appears somewhat in his general appearance, Mr. Stuart struck out on a new path and took engineering as his profession. He attended the Virginia Military Institute, graduating in 1901. He then took a student course with the Westinghouse Electric and Manufacturing Co., receiving from them a degree as Electrical Engineer and an experience such as only work in an electrical plant can afford. He stayed with the Westinghouse concern till 1911, charge of one of the sales offices having been committed to him. It was his work for several years to introduce Westinghouse equipment into mines in an area extending from West Virginia to Alabama.

After this extensive experience, in which he became well acquainted with mine machinery, the coal seams and the men operating both, he became leading partner of Stuart, James & Cooke, consulting engineers, and took an active part in the installation of coal-mining, steel and other industrial plants.

When Mark W. Potter, chairman of the Carolina, Clinchfield & Ohio R. R., sought some one to study coal- and freight-handling facilities and the coal-handling arrangements of ocean-going vessels, it was Mr. Stuart who was chosen as his representative, his investigations taking him to Europe.

The war converted Mr. Stuart into a government administrator. He gave up his consulting work to take charge of the Power Section, and later became a member of the Production Committee. In the great period of reconstruction which doubtless will soon confront us, Mr. Stuart will take a leading place. The plans of the after-war period will make previous plans look amazingly crude. We are going to need consulting engineers who can visualize for capital a new order, who can catch a glimpse of a more finely adjusted industrial commonwealth where waste and inefficiency will be banned. A man relatively young and with vision, Mr. Stuart will be among those who will start us on this new path of progress.

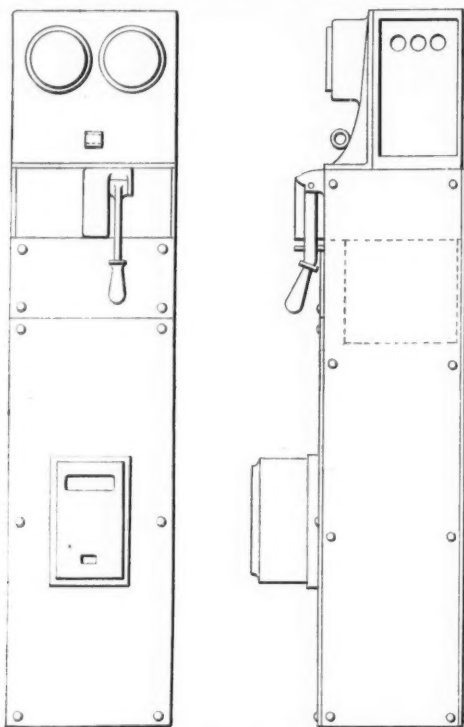
Deeper Mining in Years To Come

Deeper mining becomes necessary as upper anthracite coal beds become exhausted. Water constantly has to be removed from the mines and the quantity reaches, in some collieries, as much as 25 tons of water for each ton of coal mined, increasing as lower beds are worked. As mining proceeds, year after year, the deeper and thinner seams must be relied upon, necessitating the removal of larger quantities of rock and refuse to get at the coal. Also mining at greater depths naturally requires more expensive ventilation, and as the mine grows in extent the underground transportation becomes more and more expensive.

NEW APPARATUS AND EQUIPMENT

Safety-First Induction-Motor Pedestals

In most industrial operations safety and efficiency are so related that an improvement in one usually effects an improvement in the other. More and better work is produced when working conditions are pleasant and healthful, and comparative freedom from liability to occupational or accident disability exists. In connection with the requirements of safety the panel shown in the accompanying illustration is of considerable interest. It is adapted particularly to the control of alternating-



FRONT AND SIDE VIEWS OF PEDESTALS

current feeder or motor circuits in capacities up to the rating of 300 amp. and 2500 volts.

The unit consists of a Type FK-20 oil circuit breaker mounted on a pedestal constructed of steel plates and angle iron, the former holding the latter in position and serving as mountings for the apparatus in the interior of the pedestal. The compartment immediately beneath the breaker and surrounded by the steel plates is used for mounting the potential and current transformers. The space above the switch serves as a housing for the disconnecting switch, and also provides a location for either voltmeter or ammeter or both when desirable. Other instruments such as watt-hour meters, etc., may be mounted on the sheet-steel front of the panel. The back of the pedestal is also a steel plate, removable to allow access to the interior.

The voltmeter and ammeter are mounted on a cast base above the breaker, and with the front edges of the instruments flush with the casting. Back of the in-

struments in the interior of the housing are spring contacts which make contact with the instrument studs, so that after removing the holding screws the instruments can be taken from their support without disconnecting the leads. When the instruments are replaced, the connections to them are made automatically. The instrument resistances are mounted behind the instruments.

The watt-hour meter is mounted on the lower front of the pedestal. The studs run through insulating bushings to the interior where they are connected to the leads from the current and potential transformers, which are mounted on strap-iron supports connecting the angle-iron uprights. The regular drilling of the supports permits mounting either one or two current and potential transformers.

The FK-20 oil circuit breaker is operated in the usual manner by an iron handle from the front. Automatic protection is obtained by two series overload coils provided with dashpot time-limit trip. The oil circuit breaker can be operated only when the disconnecting switch is closed.

The disconnecting switch is operated from the front of the pedestal by a removable handle so interlocked with the oil circuit breaker that the disconnecting switch can be operated only when the breaker is open.

The breaker can thus be cut out of service at any time when open, and can be inspected or repaired without danger. The oil tank cannot be taken off the breaker nor can the cover over the disconnecting switch be removed unless this switch is open.

The disconnecting switch and the oil circuit breaker can both be locked open by removing the disconnecting switch handle. This handle can be removed or attached only when the disconnecting switch is open.

It is impossible to get at the live parts of the apparatus until portions of either the back or the front of the pedestal have been removed.

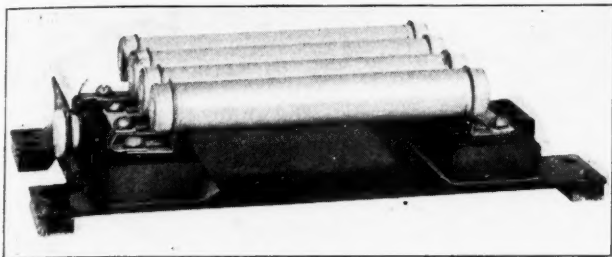
The panels occupy small space and are easy to install. Pedestal-type units are designed for single or group mounting and have a large bus compartment just above the disconnecting switch and inside the cast-iron housing. Connections run either to top or bottom of the pedestal, but as a rule the leads enter from the bottom as this is generally the more convenient arrangement. After being put in place the pedestals are secured by bolting to the floor.

Enameled Resistance Units for Current Regulation

Enameled resistance units for regulating current have been developed in various forms and sizes by the General Electric Co., of Schenectady, N. Y. Some of the applications to which these units have been put are railway and fire-alarm signals, fractional horsepower motors and locomotive headlights. They are also used extensively in series with relay, contactor and circuit-

breaker coils on panels and switchboards. They will be found particularly applicable in mines and similar places where a great amount of dampness and moisture is present. These units are unique in their ability to withstand unusually high temperatures as well as sudden changes in temperature from one extreme to the other.

The resistance wire or conductor is wound either upon a steel body coated with a special refractory



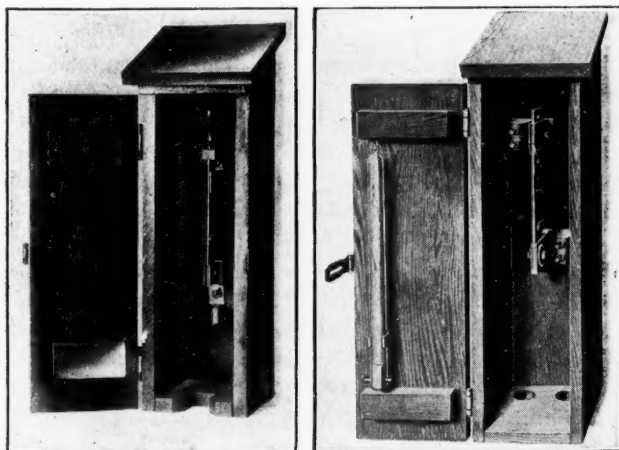
ENAMELED RESISTANCE UNITS

enamel or paint and high heat-resisting silicate compound developed to withstand sudden extreme temperature changes without cracking or weakening or in any way being injured. The steel body is preferred for extreme lengths where strength for a long span is required and is especially serviceable where the unit might be subjected to severe vibration or shock.

The refractory silicate body is used for most of the ordinary types of resistance. The compound employed is far superior to porcelain or any equivalent ceramic products which are easily cracked or weakened mechanically by repeated and extreme temperature fluctuations.

New Type of Line Switch

The accompanying illustration shows two types of line section switches of different capacities. The 750-volt switch is the one used for low voltages. It is provided with a wooden box so designed that when the switch is opened the handle drops into a slot in the



LINE SWITCHES AND THEIR INCLOSING BOXES

bottom of the box. This allows the door of the box to be closed and locked, thus making closure of the switch by unauthorized persons impossible. At the same time this exposes no live parts.

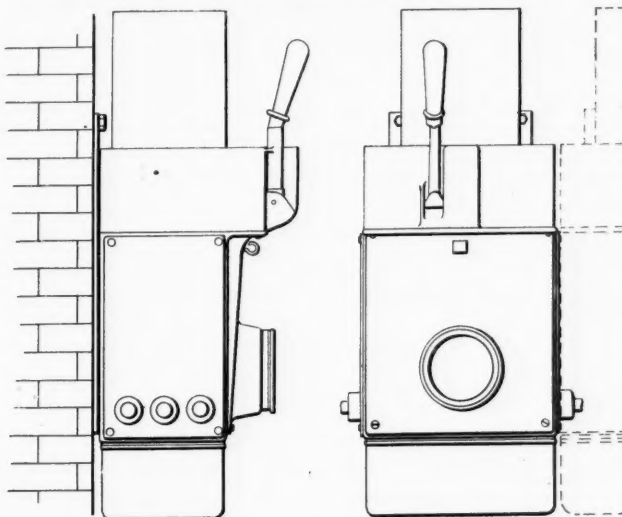
The other switch is a heavy-type service switch inclosed in a wooden box which can be locked. This switch is opened and closed by an insulated hook stick which is separate from the switch. Suitable attachments inside of the box hold the hook stick when not in use.

The smaller of these Westinghouse line switches are for potentials up to 750 volts and capacities of 200, 400 and 600 amp. The heavy switches are for voltages up to 1500 and capacities up to 1200 amperes.

Wall-Type Switching Unit

The wall-type switching unit here shown is manufactured by the General Electric Co. It is intended for the control of alternating-current circuits up to 300 amp. and 2500 volts. The unit consists of an industrial type oil circuit breaker with a space above which serves as a housing for a disconnecting switch, current and potential transformers and also provides a location for either voltmeter or ammeter, or both when desirable.

Following along the lines of safety, the disconnecting switch is interlocked, mechanically, with the oil circuit



FRONT AND SIDE VIEWS OF SWITCHING UNITS

breaker so that the switch cannot be opened when the breaker is closed, nor can the breaker be closed while the disconnecting switch is open. A key projecting through the front of the panel is used to operate the disconnecting switch. This key can be removed when the switch is open, and carried by the operator, who then is assured that no one will close the switch while he is working on either the line or apparatus on the circuit controlled by this unit. The interior of the switch compartment is inaccessible while the switch is closed, and the oil tank cannot be removed while the disconnecting switch or oil circuit breaker is alive.

These switching units are particularly adapted to the control of circuits feeding banks of transformers and motors, in places where it is desirable to mount the motor control appliances on walls or pillars. The units are self-contained and may be considered as "safety first" in every particular.

Wall-type units are designed for single or group mounting and have a large bus compartment just above the disconnecting switch and inside the cast-iron housing. Conduit connection with the unit can be made from above, below or from either side.

Paul Breathing Apparatus

The development of self-contained oxygen breathing apparatus has been coincident with the rapid growth of our industrial life. As mine entries have been extended and have penetrated to greater depths, the problem of rescue work has become one of vital interest. Strangely enough, however, it was not until 1907 that this important branch of the mining industry was taken cognizance of by the Government, in which year appropriations were granted by Congress to the technologic branch of the Geological Survey to purchase rescue apparatus and train men in its use.

Prior to this date two large mining companies, one in the anthracite field and one a metal-mining company in the West, had installed rescue apparatus on trial, recognizing the need of such equipment provided, of course, that it possessed the proper elements of safety and efficiency. All forms of apparatus of this nature purchased by the mining industry in 1907 and thereafter until the outbreak of the great European war in 1914 were of foreign manufacture.

Nevertheless, the United States was not lacking in a proper and careful consideration of this important subject, and experts in this line were giving thought to the subject, having in view not only the perfection of the then existing forms of breathing apparatus, but the desirability of establishing the industry in this country on a firm footing, independent of the uncertainties of importing conditions.

When in 1907 Dr. Holmes, the "father" of the present United States Bureau of Mines (then the technologic branch of the Geological Survey), selected his lieutenants, who were later to become experts in their respective fields, he chose James W. Paul to take charge of the mine rescue and lighting division and Clarence Hall to take charge of the explosives division. Both of these men, who have since become well known in the mining industry, were by training and experience particularly qualified for the work which they undertook. Mr. Paul, a graduate in mining engineering from the University of West Virginia, who later amplified his training at Columbia University in New York City, was selected to organize the mining department of the State of West Virginia. This department grew under his direction for 12 years, after which he gave up the work to devote his energies to governmental investigation work and particularly to the use and development of oxygen breathing apparatus.

Mr. Paul's work since then is too well known to call for more than the briefest outline here. It is sufficient to say that he has attended and taken direct charge of the rescue work at probably more mine disasters and fires than any other person. He has made two trips to Europe in behalf of the United States Government to investigate resuscitation and study rescue methods abroad. And finally, he has given extended thought to the apparatus under actual working conditions with a view to improving the design. The findings of this research appear in Technical Paper No. 82 of the United States Bureau of Mines, in the preparation of which Mr. Paul had the benefit of the advice of one of the leading physiologists of the country—Dr. Yandell Henderson of the Yale Medical School.

During the period while Mr. Paul was not connected

with the work of the Bureau of Mines, and while he was affiliated with Mr. Hall, who had previously left the bureau's service, he took out patents on the details of construction of an oxygen breathing apparatus which incorporated the results of the thought which he alone was able to give to this subject. This apparatus, which bears Mr. Paul's name, is now for the first time ready for the inspection and use of the mining industry. It is another indication of the dominance which the United States is rapidly acquiring in the field of applied science.

The Paul breathing apparatus, it is needless to say, has incorporated in its construction the requirements as set forth by Mr. Paul in Technical Paper No. 82. One of the highly essential and interesting features of this apparatus is the combination of the self-adjusting oxygen feed valve with the low pressure oxygen control valve in the intake of the circulatory system. Thus the operator during periods of violent exertion not only obtains from the apparatus all of the purified cool air that he can use, but a pressure well in excess of one centimeter of water column is maintained throughout the entire circulatory system.

A natural circulation is used in the Paul apparatus. The respired air passes direct from the mouth of the wearer to the regenerator, thence through the cooler and returns to the fresh-air bag, which is suspended on the chest of the wearer. Ample conduits throughout the system insure a minimum of resistance. The oxygen is fed directly into the bag as rapidly as required, and while there is always plenty to meet the most violent exertions of the wearer, it is at the same time conserved when he walks, works slowly or rests. The regenerator, or carbon-dioxide absorbing device, is of new construction and efficiently purifies the respired air to such an extent that during the full working period of a single charge, which varies from 3 to 12 hours depending upon the violence of the operator's exertion, not more than 1 per cent. of carbon dioxide ever passes into the inspired air conduits.

The Paul apparatus is well balanced. It fits the operator snugly and is easily and quickly adjusted. The conduits are carried at the left side of the wearer in a projected position, so that the right side and shoulders are entirely free for carrying forward the work in hand. Freedom of head movement is attained by amply long flexible tubes connecting the mouthpiece with the headgear and respiration chamber. The back part is hung low and is protected against damage by a metal cover. By means of a body strap the back part is held snugly against the body even while the operator is bending low.

The simplicity of construction of the apparatus with the few working parts provides an important element of safety. The pressure gage is carried in a pocket on the left shoulder and may be conveniently consulted. It is calibrated in atmospheres.

The mining industry of this country may justly feel gratified to know that American brains have accomplished so satisfactory a result as appears to have been attained in the new Paul breathing apparatus, and as it is to be manufactured exclusively in this country the uncertainties of importing conditions will not stand in the way of assuring the users of prompt delivery of the apparatus and parts.

News From the Capitol

By Paul Wootton



Mines Producing Poor Coal Shut Down

The United States Fuel Administration during the week ended Oct. 28 issued orders to 13 coal mines prohibiting them from either shipping or mining any coal, making a total of 99 mines closed since the Administration inaugurated its clean-coal program. These orders were issued following reports from inspectors of the Administration which showed that either the coal from the mine was of such poor quality as to be useless, or the producers were not properly preparing the coal by cleaning it before shipment.

In the case of poor preparation by the operators, where the coal was found to be dirty and not usable, the companies were prohibited from shipping their output. The names of the operators affected by the orders are as follows: Kronnenwetter Coal Co., Benzinger Coal Co., M. Schieler & Son, Clemens Habberger, Erich Coal Co., Star Coal and Clay Co., Joseph A. Fritz, George Wolf, all of St. Marys, Penn.; McCullough Coal Co., Shanklin Coal Co., of Brockwayville, Penn.; the Liberty Coal Mining Co., of Madera, Penn.; J. H. Steele & Co., Kersey, Penn., and Walter Seidy, Black Lick, Penn.

Following the general policy of the Administration in not permitting any more than is possible of poor quality coal to be placed upon the market, the inspectors reported also 19 mines who were working veins with poor quality of coal in them, and these mines have been ordered to suspend operations from that portion of the mine. It has been the custom of the operators to mix this coal coming from poor quality veins with the coal from the veins of better quality, which does not conform to the policies of the Fuel Administration.

Offer of Coal to Holland Hurts Germany

Gratifying results of the international situation from the offer of the United States to supply Holland 100,000 tons of coal per month, if she requires it, already are in evidence according to information received by Harry A. Garfield, United States Fuel Administrator. Although all this coal may not actually be required, and possibly none of it will be called for, it has furnished an effective lever for the Dutch in their relations with the Germans.

Both Switzerland and Holland, it was stated, have been in vital need of coal, which at times the Entente Powers could not supply. When negotiations were afoot with Switzerland, the French, although already distressed for coal, united with the English in an offer of a far greater supply than that made at present by

the United States to Holland. With this support the Swiss were immediately relieved from much German pressure and were able to negotiate with a free hand. They finally got most of their coal on a satisfactory basis from the Germans, and the French were actually called upon to furnish but little.

The plight of Holland was much worse, and the exports from Holland to Germany were considered of such moment that an offer of coal was made through the War Trade Board. Information reaching the Fuel Administration was that the Dutch, no longer afraid of being frozen this winter, are stiffening up in their negotiations, and our armies and the French in Northern France and Belgium are receiving supplies of fat which they need. The offer also has considerably affected German prestige, according to reports received, the Germans having insisted in their negotiations that America was utterly unable to furnish this coal.

Fuel Administration Engineer to Confer on Use of Illinois and Indiana Soft Coal

To further the educational campaign in Illinois, Indiana, Ohio, Michigan and Wisconsin, and to confer with the state administrators and local fuel officials on the use of Indiana and Illinois bituminous coal for domestic purposes, instead of anthracite and Pocahontas coal as heretofore, Thomas C. Mahady, domestic fuel engineer of the United States Fuel Administration, started Oct. 29 on a ten days' trip through those states. Meetings will be held at Chicago, Columbus, Milwaukee, Indianapolis and Detroit, and the best and most efficient means of using Indiana and Illinois soft coal in kitchen ranges and converting base-burner stoves to soft-coal heaters, with the most economic use of fuel, will be discussed.

Besides the change from anthracite to bituminous coal in the five states named, Mr. Mahady will confer with fuel officials on the problems of the distribution of local coal under the new zone system and the necessity for the extensive use of Indiana and Illinois bituminous. The conservation of water is another subject that will be discussed in the several gatherings of fuel officials.

The plan of the mayor of Highland Park, a suburb of Chicago, will be made the subject of an investigation by Mr. Mahady while at the latter place. When the order went out from the Fuel Administration at Washington that Indiana and Illinois soft coal must be used largely in place of anthracite, the mayor of Highland Park called in competent engineers and with their aid

worked out a plan to make every stove and heating apparatus quickly and cheaply adaptable for use of soft coal. Volunteer committees were then formed, printed instructions issued to every householder and personal instructions offered wherever it was necessary. Shortly thereafter the mayor sent out word that "Highland Park will use no anthracite or Pocahontas and everyone will be comfortable."

The success of the campaign, though purely local, attracted the attention of the Fuel Administration officials and Domestic Fuel Engineer Mahady was instructed to investigate it and make a report as to its practicability and possible use in other sections.

New Fuel Administrator for Virginia

R. H. Angell, of Roanoke, Va., has been appointed by Fuel Administrator Garfield to be Federal Fuel Administrator for Virginia, in the place of H. F. Byrd, who has entered the military service. Mr. Angell, who is a well-known banker and business man of Roanoke, was at the time of his appointment local fuel administrator at Roanoke.

No Eastern Coal for Western South America

The War Trade Board has been requested to stop issuing licenses for the export of eastern coal to the west coast of South America. The request is based on a desire to have the west coast of South America supplied with coal from the western states of the United States, leaving the high grade eastern coal for its important war uses.

Clubs May Use Certain Kinds of Coal

The United States Fuel Administration has issued an order authorizing each state fuel administrator to give country clubs the necessary permits to receive and burn, during the winter, bituminous or steam anthracite, whenever, in his opinion, there is a surplus of such fuel for this purpose. The authorization further states that under no condition should any country club be permitted to use domestic sizes of anthracite coal, either for cooking or heating purposes.

Coal Zone Permit Bureau Now Consolidated With Bureau of Statistics

The Coal Zone Permit Bureau of the Fuel Administration has been consolidated with the Bureau of Statistics. Wayne P. Ellis, the assistant director of the Bureau of Statistics, has been placed in charge of the permit activity, which will be known now as the Coal Zone Permit Section of the Bureau of Statistics. C. E. Leshner is the chief of the Bureau of Statistics. C. B. Nichols, who formerly had charge of the Coal Zone Permit Bureau, resigned to assist C. C. Marvel in by-product coke distribution.

Large Saving of Fuel in Merchant Marine

Due to the investigations of economies in combustion, which have been conducted for a number of years by Henry Kreisinger, of the Bureau of Mines, an important saving of fuel in the new merchant marine has been effected. Certain recommendations changing the design of the furnace of the boilers which are destined

to run the emergency fleet make it possible for six tons of coal to do the work which formerly required seven. This accomplishment is heralded as the outcome of purely investigatory work which, when applied in practice, has shown immediate results.

New Prices for Alabama Coal

New prices have been authorized for coal mined by the West Helena Coal Co. in Alabama, as follows: run-of-mine, \$3; prepared sizes, \$3.30; slack or screenings, \$2.65. Prices for coal mined by the Warrior Pratt Coal Co. have been fixed as follows: run-of-mine, \$2.25; prepared sizes, \$2.50; slack or screenings, \$2. In each case, forty-five cents may be added if the terms of the Washington wage agreement are met.

Surplus Coal at the Mines

A surplus of coal at practically all mines west of Pittsburgh has been reported to the National Coal Association. While exact figures are not available, it is known that the surplus tonnage is very large. The condition is attributable largely to the possibility of an early peace. As long as an early peace is a possibility it is expected that certain classes of manufacturers will not keep their storage at the maximum limit. If, on the other hand, Germany should decline to accept the terms of the allied armistice, it is expected that the surplus will fade out very promptly.

Another influence which has contributed to the surplus is the exceptionally favorable weather which has prevailed throughout the country for the past month and more. November of last year was ushered in with unusually cold, bad weather which interfered very greatly with transportation.

No Soft Coal Shortage in New England

Continuance of good weather has made possible maximum deliveries of coal to New England where the storage is now sufficiently large to preclude any probability of a shortage in that section this winter. Some difficulty is being experienced with anthracite, but that is said to be due more to inequality of distribution than to shortage. There is still a very marked shortage of navy coal. Owing to the very strict inspection, upon which the Navy insists, a portion of the coal which was included in the estimates for the Navy requirements are not passing the test.

From incomplete statistics showing the coal saving made possible by the skip-stop method of operating street cars, the Fuel Administration estimates that a 10 per cent. saving of fuel is resulting.

Due to the successful results which have been obtained by the methods employed by James B. Neale in stimulating coal production, a similar plan is to be carried out with regard to coke. The work is to be under the direct supervision of W. S. Blauvelt.

The Fuel Administration announces that manufacturers of incandescent electric light bulbs, by agreeing to limit the production of lights having carbon filaments and substituting them with the more efficient metallic filament types, have made possible a saving of one million tons of coal annually.

THE LABOR SITUATION

General Labor Review

At last, Oct. 31, the final action by Fuel Administrator Garfield has put the new schedule for the anthracite region into operation. Just as legislation is passed by one House in Congress, approved by another House, signed by the President and interpreted by the local Federal Court and the Supreme Court, so now wage schedules are made by a commission of operators, miners and fuel administrators, approved by the conference of National Labor-Adjusting Agencies, signed by Dr. H. A. Garfield, the Federal Fuel Administrator, and interpreted by the courts of mine workers and foremen, of labor leaders and managers, by the Anthracite Conciliation Board or by the umpire of that board. The process is complicated in a degree, but that is necessary and therefore excusable.

The Fuel Administration in its Oct. 31 bulletin says as follows: Wages in various mines are not identical to the cent, and an absolute interpretation of the scale in dollars and cents as to every mine worker is therefore impossible. A memorandum was submitted to the Conference of National Labor Adjusting Agencies, as being fairly typical of the general situation. In some instances the wage increase received will be materially less, and in some instances materially more, than the tabulation shown below:

WAGES OF EMPLOYEES WORKING OUTSIDE THE MINE

Occupation	Base, Cents per Hour	Adjustment, Cents per Hour	Rate, Cents per Hour
Blacksmith.....	.32 .35	.25	.57 .60
Carpenter.....	.32 .35	.25	.57 .60
Shaft engineers.....	.36 .40	.25	.61 .65
Firemen.....	.23 .28	.25	.48 .53
Machinery repairmen.....	.30 .32	.25	.55 .57
Laborers.....	.195 .235	.225	.42 .46

WAGES OF EMPLOYEES WORKING INSIDE THE MINE

	Base	Adjustment	Rate
Contract miners*.....	\$5.63 per day	\$1.00 per day	\$6.63 per day
Contract laborers.....	26c. @ 40c., per hour	30 per cent. plus \$1 per day	\$3.70 @ \$5.16 per day
Consideration miners.....	40c. @ 45c., per hour	25 per cent., plus \$1 per day	\$5 @ \$5.50 per day
Company mines.....	32c. @ 35c. per hour	25c. per hour	57c. @ 60c. per hour
Inside laborers.....	26c. @ 29c. per hour	25c. per hour	51c. @ 54c. per hour

* Average per start, Aug. 18.

It may be added that the base mentioned is not the scale of Nov. 17, 1917, but the scale of May 5, 1916.

The increase, even before it was finally granted, awakened what might fairly be called the cupidity of the bituminous miners. The basis for the increase was the larger wages of the bituminous mine workers. It was acknowledged that there was a differential between the two wage scales which, under present conditions at least, was inexplicable. So the anthracite mine workers' wages were advanced. Now the bituminous miners assert that they should receive an equal advance. They have presented their demand to the labor-adjusting boards and to the Fuel Administrator. It has not been met with disdain; it has been met with sorrow. Patriotic men find it hard to conceive how any men proclaiming themselves patriots can, without having any basis for complaint, present at this time a demand for more wages.

The bituminous mine workers on Nov. 1 presented their protest to President Wilson saying that Dr. Garfield's refusal was arbitrary, autocratic and unfair. The telegram states that they (the bituminous mine workers) deeply resent the treatment accorded the spokesmen of the miners of the United States by the Federal Fuel Administrator Garfield.

In central Pennsylvania the mine workers have been greatly worked up over the fact that their tonnage has fallen because of the epidemic. Approximately 10,000

patriotic mine workers went into the mines on Sunday, Oct. 27 and loaded about 50,000 tons. The influenza has had a bad effect throughout the United States. In the week ending Oct. 26 only 11,215,000 tons of bituminous coal were mined, which is a decrease of 309,000 tons from the week before. The production of anthracite dropped to 1,714,000 tons, a fall of 17 per cent. from the output in the same week in the year before. Influenza is reducing production in Iowa, Missouri, eastern Arkansas, Oklahoma and Texas.

To return to the affairs of central Pennsylvania, an effort to increase production by promising a big banquet to the Westmoreland County mine which makes the greatest average increase in its coal production during November is worthy of record. The competition will be limited to those mines which produce 10,000 or more tons per month.

It is probable that the mine winning the dinner will also land the service flag for one month. This flag is to be awarded each month to the mine making the greatest actual increase in its output. A mine which wins and holds the flag during a series of months will be awarded permanent possession of the honor banner at the close of the coal-production campaign.

CHICKASAW AVERAGES \$189.02 PER WORKER

At the Allegheny River Mining Co.'s mine at Chickasaw, in Armstrong County, there are 205 names on the payroll. Every person on that roll has a Fourth Liberty Bond and the total subscription is \$38,500 or \$189.02 per person and about \$1000 for every boy in France, for the town has furnished 39 valiant sons to the service. This is a splendid record of patriotic effort. As the quota through the United States, exclusive of New York, is \$46.66 per person, earner and non-earner alike, it is clear that the record of the earners of the Chickasaw mines is high enough to place the whole village in a position of having done its full share.

From Williamson, W. Va., comes a remarkable report of performance regarding H. L. Witt, an employee of the Chattaroy Coal Co. Writing to us, O. O. Milby, the manager, says that he is very proud of Witt's record and feels it is worthy of publication. It certainly is. Witt, who is 35 years old, loaded, since Jan. 1, up to and including Oct. 23, 3164 two-ton cars or approximately 6828 tons of coal. He has purchased \$4500 worth of Liberty Bonds, \$100 in War Savings Stamps and he has contributed "very liberally to the Red Cross and other charities; the exact sum," says Mr. Milby, "we do not know." Mr. Witt is a ready and willing worker, very seldom missing a day when he is able to work.

The miners in the Illinois fields adjacent to St. Louis have probably lost no time because of the influenza, for if there had been no epidemic the mines might have been shut down for lack of demand. The operators believe that the disease served to limit the output when a limit was advantageous.

In the Springfield district, the output of which goes mainly to the north and northwest, production of the 18 mines in the vicinity of Springfield and of the greater number of mines in the district is getting back to normal. A week ago three of the Springfield mines were closed, principally on account of the influenza. These were the Chicago-Springfield, the Woodside and the Jones & Adams. Now all of these are working. There is still some shortage of men, but probably that shortage will not exceed 300 men, and the resulting curtailment of production will not exceed 1800 tons a day.

David Wilson, member of the Miners' Executive Board in the Belleville District, says that the Baltimore & Ohio RR. and the Louisville & Nashville RR. have not been able to supply enough cars for the mines in their territory. Wilson and other leaders among the miners also complain

that repairs and machinery defects cause frequent shut-downs. The operators, on the other hand, say that the men are irregular in their work, and exhibit their payrolls to prove it. They say that the greatest loss in production is due to the failure of the railroads to furnish cars and that the next greatest loss is due to the laying off of the men to "blow in" their big earnings. At some of the mines the men, in order to escape the charge of laying off, ask for their time and quit and when they have spent their money they return to work. Because of the shortage of labor the operators have to put up with the practice.

The miners' organization of Belleville, Ill., has subscribed for \$150,000 of Liberty Bonds. This is a part of the \$500,000 which is to be subscribed by the state organization.



MINE MORE COAL

UNITED STATES FUEL ADMINISTRATION

STAND BY THE BOYS IN THE TRENCHES!

Sostenete i soldati nelle trincee!

ESTRAETE SEMPRE PIU' CARBONE !

Pomogni našoj mladosti u rovovima !

KOPAJ VIŠE UGLJEVLJA !

Podpiraj vojake v strelnih jarkih !

KOPLJI VEC PREMOGA !

Wspomagajcie wiernie tych ktorzy sa na linii bojowej !

STARAJCIE SIĘ POWIĘKSZYĆ PRODUKCJĘ WĘGLA !

Segitse a fiukat a lövészárookban !

AKNAZZON TÖBB SZENET !

Unterstützt die Jungen in den Schützengräben !

FOERDERT MEHR KOHLE !

Many mine washhouses have been closed in order to prevent a spread of influenza. Special efforts are being made by Director Drake of the State Department of Health to prevent the occurrence of such conditions in the Illinois mines as have existed recently in those of Kentucky. Special representatives of the State and United States health organizations have been sent into all of the mining centers. A strict quarantine has been established at Rose-clair. Reports are that the disease is subsiding in the northern part of the state. There has been some increase in the disease in the central and southern portions.

In Vancouver Island an excellent principle for some time in force in eastern British Columbia does not appear to have been operative. That principle was to increase wages with changes in the cost of living. As the prices of commodities rose the mine workers of Vancouver Island found themselves progressively impoverished, and they demanded an increase of \$1 a day. With an inadequate inquiry, but with a desire to satisfy an inequity recognized as existing in the old contract, J. D. Bulger, Dominion fair-wage officer, and Nichol Thompson, British Columbia adviser to the Fuel Controller of the Dominion of Canada, offered an increase of 75c. per ton, which was accepted.

The final arrangements were made Oct. 24. The mine workers wanted an immediate readjustment, but the operators opposed this, saying that the increase in wages should go into force concurrently with a rise in price and that could not be arranged with the Fuel Controller till Nov. 1. The latter, therefore, was the date adopted.

Vancouver is to get a sliding scale of wages to accord with costs of living. Next January the first adjustment will be arranged but not made. The increase in wage will not go into effect till February. Meanwhile the public will know what to expect and will make arrangements accordingly. Every three months a commission consisting of the fair-wage officer and representatives of the operators and mine workers will appraise the cost of living, render a decision as to the increased wage which will countervail it and then the new scale will come into force one month thereafter.

After the War

BY JOSIAH KEELEY

General Manager, Cabin Creek Consolidated Coal Co.
Kayford, W. Va.

"Making the world safe for democracy" is now one of the world's best-known phrases. "Making democracy a safe thing for the world" is also in the minds of many, but it is an after-the-war consideration. However, we can not too soon begin to draft the policies of the reconstruction that may follow the war.

Two years ago, at least one large coal company expressed itself rather frankly as to the impropriety of a coal journal devoting a whole page, or even more, to "The Labor Situation." Many companies seemed to feel that they could avoid having any labor situation by not admitting publicly that any such thing existed. But during these same two years they have had little else to think about, and some of them have contributed materially to the establishment of the present labor situation.

The more violent labor agitators are fond of representing that labor is being "emancipated," hoping to force on the minds of the public an analogy between the condition of the negro and the status of the workingman. If we are to accept this viewpoint of the labor situation as true even in part, then, for the good of the country, we should seek to avoid some of the mistakes that were made in the freeing of the slaves.

If the Man of Galilee should at the present time preach to us the doctrine, "Render therefore unto Caesar the things that be Caesar's," the public might promptly answer that, if it was consulted, there was not going to be any Caesar. But this much-quoted Biblical doctrine has been held to teach not autocracy specifically, but the acknowledgment of constituted authority, democratic not less than autocratic; and, if this is the right interpretation, what we shall have to determine now or after the war is, what are the things that belong to Caesar.

Of course, there would be no special propriety in taking up space in a coal journal on so general a proposition, if it were not for the fact that the labor situation is a topic of growing importance in mining villages everywhere. Most other industries are located in the cities where they are policed more or less by the civil authorities, but the coal camps are isolated centers with little civil authority in evidence short of the county seats. They are consequently fertile fields for disorder. Moreover, small places are so unified in their purposes and sentiments that a non-partisan administration of justice is not attainable; and, even if it were, it would be inadequate to cope with the pressure that a large camp of miners might be able to bring to bear on it.

While the growing strength of organized labor is not necessarily a menace, there are enough uninformed individuals who take the idea of an actual emancipation so literally that there is a question whether the more moderate workmen will be able to set any definite limit to what is a necessary authority, and as to what constitutes a reasonable demand from labor.

Those who express such a fear may be held to overlook the value of the discipline which an organization of indus-

trial workers can exercise when led by men properly vested with authority. But such leaders do not have matters all their own way. However wise they may be, disobedience is prevalent, and violations of contracts go unpunished. However moderate they may be makes little difference, when they are but the mouthpieces of "emancipated" laborers. Such considerations give us pause whenever we begin to show too great a confidence in the powers of control and the ripeness of judgment of the men in charge of the union.

After the war, these leaders will no longer be able to invoke war necessities as they can at the present critical time when our sons' lives are hostages for our good behavior. Every week we find that outbreaks against union orders are quelled only with the greatest difficulty. Whenever some real or fancied advantage is at stake, the loyalty of the mine workers to the nation as a whole is apt to give place to a loyalty to their immediate fellows or to some other "thing which nearer lies."

SOME CONTRACTS THAT WE ALSO HAVE SCRAPPED

We are spilling the best blood of America to repudiate the nation which considers an agreement but a scrap of paper. Yet at the same time the unions are, by threatening strikes, tearing up wage contracts, which they themselves, and not their forbears, just as solemnly signed, only a few months ago. In the newly conceived democracy of labor, one hundred per cent. of loyalty to contract is the only thing to differentiate America from Russia. It matters not how loyal the organizations are if they lack responsibility. The English Dissenters, the French Jacobins, the Roman Plebeians, and the Russian Bolsheviks all had some good leaders, but not all of them were able to subdue the spirit which their magic had raised.

Why should we not devote space to our labor situation? It is a dangerous case when such a fear weighs on the public that it shrinks from discussing it. We all know that labor can out-vote and out-fight capital if ever it makes common cause against it and forgets for a while the services that an oppressed, but rightly regulated, capital can perform for the working man.

The present war is far from being a "rich man's war." It brings nothing to rich men but the opportunity for sacrifice and service. It is even more costly to the rich than to the working man, and it offers opportunities to labor which labor has not been slow to recognize. And certain kinds of labor feel that the advantages the war affords have not been cashed in as yet. The ultimate reckoning it feels will be completed only—"after the war."

"AFTER THE WAR" WILL THE SKY BE THE LIMIT?

"Mother" Jones is touring the coal fields urging the production of coal and the buying of Liberty Bonds, but after every appeal she points to the goal to be reached "after the war." Germany's toast, "To the day," and Madam Defarge's laconic salutation to her Jacobin hosts, were never more significant than this labor slogan of "After the War." Not necessarily a challenge, not necessarily sinister, but embodying potentialities for a national calamity if not guided by sympathetic hands.

The extraordinary wartime wages, now enjoyed, appear to many labor enthusiasts as a direct victory secured by labor as a result of its presenting to capital an unbroken front. Not knowing exactly the things that are Caesar's, and having no way of telling just what the limit might be as to shortness of hours and size of wages, the national tendency is to make the sky the limit and let Caesar look out for himself. Since the Government, a hazy sort of something at Washington, has put forth a restraining but kindly hand and said, "Not now," why, of course, *after the war* must be the time.

With the publicity that has been given to production cost, and with a government selling price, there will not be much excuse if labor does not know what the operator is getting out of the coal business the next time an agreement for a wage scale is sought. The public will be informed, too, so the only question to be settled in the after-the-war working agreement is how much of the joint product of labor and capital rightfully belongs to

each. The public has been assured repeatedly that after the war labor will get its "full share." Until that time comes and the demands are made we shall not know whether labor realizes that there is a just limit to its demands or harbors an insane vision of confiscation.

It seems that from the beginning there has been a groping for a better condition for labor. The early Christians looked for an earthly kingdom in which fishermen should rule over the Roman Caesar, and, in anticipation, questioned the payment of their taxes. From the beginning of the coal industry, the discipline of the coal companies, in many cases, has been the only check on the life of the coal camps, the company being so closely identified with the civil authorities that little distinction was made.

When the civil authorities went into a camp for an offender against the civil law, some company official was called on for assistance; and, if any witnesses were necessary, the company furnished them. Under such conditions, disloyalty to the employer was practically disloyalty to Caesar. While in some instances this identity of company and state might have been sought for, in most cases it came about naturally from the very nature of things, those possessing anything to lose controlling the custodians of the law in the isolated camps.

It has been impossible to fight Kaiserism abroad without some introspection at home, and it is perhaps natural that the minds of labor turn to their old enemy, capital, and hang on it all the iniquities of Kaiserism.

OPERATOR WAS FORMERLY LEADER OF HIS MEN

Less than a score of years ago the political strength of most of the big labor-employing industries consisted in their ability to deliver votes. They did not necessarily use any sinister influence, because the men accepted the leadership of their employers. With the coming of labor organizations, votes are bid for in another way, and the only political strength left to capital is to use its money, when it has any, in issuing circulars and arranging political meetings.

After the war, the coal companies may face their employees somewhat in the role of a discredited Kaiser. They will have imputed to them their old-time faults, for which they are not entirely responsible, and they will be credited with many new sins, which will be grouped under the generally detested head of Kaiserism. On the other hand, labor will stand "emancipated" with a country's blessing on it for its loyalty in the great war. Its treasury will be full of money; its membership will be largely increased, and its spirit will be rendered as militant as the spirits of the sons of labor who will then have returned from destroying Kaiserism abroad.

United under the leadership of men, who, for the period of the war, have helped to advise our government; armed with votes and with governmental sanction; and, finally, having a definite time set for getting its share—namely, after the war—what may not eventuate if some attempt is not made to meet the difficulty by the education of everyone to the true course of action.

SETTLE NEITHER BY FORCE NOR BY CUNNING

In all probability this vision is more or less fanciful, but that it may assume such an attitude should never be overlooked. Probably many of the wiser heads among the mine workers would do their best to prevent any such situation, but it is unquestionably in the minds of enough of the radicals to give it at least a beginning.

An abundance of labor after the war may have a steady effect, but the attitude of both the operator and the labor leaders upon approaching the conference will largely determine the ultimate outcome.

If collective bargaining is to be the coming method of determining wages, then it ought not to be a question of one side wringing concessions out of the other, and going back to constituents to say, "We got the best we could." As long as a wage scale is to be determined by the amount of pressure which one side can bring on the other, so long will there be an incentive to organize the sides in such a way as will make democracy unsafe for the world.

EDITORIALS

Let Us Be Liberal Hosts to Our Men

THE war is not over. What is more, we do not know when it will end. But if it were over, entirely over tomorrow, the money of America would have to be poured out nevertheless for war-camp activity. For with war there is idealism and there are duties. There will be no letting down in the presence of national enemies. Never for a moment will we forget that we are Americans, to serve, to suffer and to sacrifice, till the hostile flags arrayed against us are lowered and until that to which we have set our hand is fully accomplished.

When peace returns and the work of the soldier comes to an end, we will have a host of men abroad in foreign cities with little or nothing to give them amusement and comforts. Then will we need the organization and recreational equipment that will take the place of the war as a stimulus to our men.

The best and wealthiest of us at times need a little welfare work. The rich man looks for a club where good fellows meet for healthful social intercourse, or he hunts him a friend in the city he visits. Our boys in France, Italy, Great Britain, Russia and Siberia have no clubs or friends to take care of them in their leisure moments except those supplied by these war activities' funds, which from Nov. 11 to Nov. 18 are going to appeal to us for \$170,500,000.

They are going to get every dollar of that sum, that they may make good hosts to our men. Let it never be said that we, the people of America, were not generous entertainers to our nation's defenders. If we fail of this duty not only will we find the morale of the service destroyed, but we shall weaken the bond that makes the nation one. It is because the nation has been such a generous host to its boys that they have been so willing to pour out their lives and their efforts so unsparingly in its service.

We need Americanism not only for the foreigner, but for the native born. We need that it shall be deep in the heart of us all, and in no way can the unity and the spirit of the nation be more truly assured than by our hearty acceptance of the opportunity of acting as the gracious hosts of our valiant defenders.

General Pershing has said that every hut adds ten men to a quota of one hundred for, largely by reason of the war fund activities, no war has ever been fought with as clean and well conducted an army as America has sent to the Old World. But that which has made these men fight like lions and conduct themselves so admirably will serve to make them in peace and on their return the great nationalizing force of the nation. These men, on coming back to America will, by their ideals and their youthful enthusiasms, vitalize all our institutions. Let them come back filled with the conviction that we were worthy of their sacrifices and that we did not forget our duty to them even when

the war appeared to be approaching, or had reached, an end. Here's to our guests, the Boys of the U. S. A.! May they, who have given so much for us, never be able to say that we begrudged to them a little entertainment and a few of the comforts of home.

After the War

EVERY one will be interested in the thoughtful remarks of Mr. Keeley appearing in the "Labor Situation" under the head "After the War." Mr. Keeley is a man of such broad mind that we regret that he has taken to "sounding a warning," a thing so contrary to our national characteristics. Mr. Keeley can see no harm and much gain in facing the facts. That is a part of the right attitude, but not the whole. There should be another ingredient in the dish—no less an ingredient than a flavoring of American optimism, the condiment that makes the bitterest of viands palatable and even nutritious.

After the war there is going to be no radical reconstruction, nor are we going to have years of uncertainty such as marked the period after the Civil War. The soldiers are not coming home to fight but to build. The workingmen and the nation's planners are going to have a broader vision. It is true a number are crying "After the War," but with most of us it means not strife, but reconciliation; not disorder, but the reknitting of scattered families.

The biggest of all reconstruction is a reconstructed spirit, a sense of unity and friendliness, a kindly knowledge of each other as of one flesh and blood, little better and little worse than one another.

The difference between bad labor men and good labor men is largely between men who know the labor movement but little and those who know it well. The rabid man once brought into touch with the employer soon realizes that the man he painted so black is merely another man much like himself, and he loses a spirit of rebellion and becomes almost a coöperator. That is why these veterans of unionism are usually disliked by the rank and file after a few years of service. They have learned to know and respect capital and have begun to realize that with all its faults capital is at least as clean as labor.

Labor has not in general learned that lesson, and it punishes those who have. In consequence the workingmen continually bring new men forward, men unlearned in the labor movement. As fast as they are honored with office they begin to learn the truth, and they cannot then be even goaded to follow policies they once led others in advocating.

Even Mother Jones is becoming less militant as the opposition to her action lessens. She is growing more tolerant as the result of the tolerance that is shown her. Doubtless she never was without a certain degree of those good qualities we associate with "woman." The

violent are not without tenderer sentiments. They could not appeal to the hearts of others unless their own hearts had something of the human quality. All of us have heard from the lips of labor agitators at some time the acknowledgment of their two-fold disillusionment—how they have lost faith in the vision of a workingman commonwealth in which every man is upright and loyal and how they have been disabused of their old belief that greed and a lack of human qualities were the distinguishing traits of the employer.

But if the labor leaders can be brought to a better understanding, why rest content with converting *them*? Why not stop raising this crop of uninstructed leaders? Why not educate all the men into the true labor situation? Let the miner learn the whole truth and see just what the operator is facing, how profits are usually only made by hours of watching and every kind of mincing economy. Let him understand the operator's difficulties, and above all let him know the operator, as much as may be, as a personal friend. It can be done, for it has been done already.

Above all, let us remember that the miner is not a problem—he is a person. A cheerful, undoubting optimism will win the miner to a reasonable state of mind. If he is given an opportunity to earn such wages as seem quite common in the bituminous region, surely he will remain content. The wage earners who have received little or no increase in wage since the war began, and there are not a few of them, call on the miner not to demand a further increase in the price of coal. Those whose earnings have fallen steadily in purchasing power are disposed to protest bitterly at a spirit of profiteering which demands of the public ever more and more.

Some one must buy what the miners have for sale, and if the price is boosted without limit other workers will be unable to secure for themselves a livelihood. The wage of the miner is paid by the sweat of workingmen, the larger the wage the more heavy the sweat. Our prayer to the miner is that in seeking the best for himself and his family he remember to be fair to those who are not engaged in mining work, or in such work as has been endowed like mining by the war.

In all of this no reference is made to the anthracite settlement. The anthracite daymen do not get an unreasonable wage and the anthracite contract miner has not received any undue advance. But the bituminous mine workers are receiving magnificent wages and should be content with them. The workingmen of America are little disposed to pay them more.

Relation of the Operator to Health

INQUIRY as to the attitude of other journals to health brought the reply: "We do not mention such things in our journal. We leave that to boards of health. It is a doctor's business to take care of the ailments of the people and not the business of the employer; so we do not think it within our scope to consider the etiology of disease."

It is not necessary to argue this question. It is so clearly refuted by the present conditions. The doctors who compose our health boards are rushed to death. Their work is with the dying. They have no time for preventive methods except an occasional word said when in the home of a grievously sick person. Somebody

else must take up the burden of prevention; others must proclaim the gospel of cleanliness and isolation. Otherwise production will fall.

Influenza has nothing to do with mining—except to stop it. The disease is spread in the social life of the people rather than in their industrial life. It is not in the mine or the street, but in the house, that the evil is done. Judging from the experience in New York, where free assembly has been little interfered with, there is no advantage in keeping people from congregating. The only action of the Board of Health of the City of New York has been to keep children out of the theaters and to try to avoid crowding in transportation. As for the last, the effort has been an entire failure; the crowding is worse than ever, but nevertheless the influenza germs do not seem to take advantage of that fact. The epidemic in New York City, despite the crowding of that metropolis, is less severe than in most sections of the country.

The poster this week calls attention somewhat unpleasantly to the evils and dangers of the home. Isolation of each individual is the lesson which the poster tells. It cannot tell it as well as it could be told in public meeting, were such meetings allowed. It should be announced again and again, that individuals should keep such germs as they have acquired and not pass them on to one another. As far as may be, every person should be isolated from his neighbor.

In our editorials emphasis has been laid on the carriage of disease using such vehicles as the towel, the apron, the knife and fork and the pencil, but there is no purpose in denying that influenza can also be readily communicated from person to person through the breath. With what celerity and at how great a distance can a man who has been chewing garlic or peanuts make himself felt! If odors can thus be projected into the atmosphere, what possibilities must exist as to the projection of germs. Your garlic-eating foreigner is an ever-present exemplar of infectious disease. If only the influenza germ were of a character that it would assail our olfactory nerves like garlic, we would gain some knowledge of its universal presence and make adequate provision against it.

Reason for House Scarcity

WHEN BOYS leave for the front or for the munition works they do not take with them their fathers, mothers, brothers and sisters. These relatives still remain, and the reduced family takes the same housing equipment as of old. A bedroom, perhaps, is idle, but no one comes to occupy it. However, as the result, the mine is now short a man, and another man is hired. He is quite apt to be a man of family, and unlike the boy who goes to camp, he brings his family with him. Thus merely by labor turnover the efficiency of housing is decreased. The blocks of houses cannot care for as many as they did.

Again, the boarding-houses have largely been depleted of their men. Some ten or twelve unmarried employees may be found living in a single building. When these men are replaced in the mine, it is likely to be by ten or twelve or more older men, who, being older, achieve less and, being married, occupy more houses. This is another of the causes of house shortage.



MOTHER'S APRON
"THE FEMALE OF THE SPECIES
IS MORE DEADLY THAN THE MALE"



DIPPING OUT OF ONE DISH
THOSE THAT EAT TOGETHER—
SUFFER TOGETHER



AIR AND SUN YOUR PILLOWS
BUT DON'T GET THEM MIXED

INFLUENZA
IS SPREAD
PRINCIPALLY
by CARELESSNESS
in the
HOME



MOTHER'S AFFECTION
WHY NOT SALUTE YOUR
BABY ON THE NECK?

EVERYBODY'S PEN
WHOEVER HOLDS IT IN HER MOUTH
WILL HAVE SICKNESS TO WRITE
ABOUT.



Influenza is not the only disease which is spread by the nose and mouth. There are several others, and, if they are to be avoided, we must beware of other lips and of anything that other lips have touched or rendered foul.

DISCUSSION BY READERS

Hindrances to Coal Production

Letter No. 5—While I do not believe that, as a rule, the average coal miner is a drunk or a sot, yet observation shows that many tons of coal are being lost daily by reason of the fact that many miners and men working in and around the mines lose several days a month, in order to satisfy their desire or thirst for drink. It goes without saying that the majority of these men would be in their places regularly if there were no saloons or places where they could buy liquor.

Living here, on the border of a wet state, one cannot fail to be impressed with the fact that the sale of liquor and the booze habit among miners are most important factors in the hindrance of the production of coal. Train after train brings men from the various coal fields to the nearest wet towns, and it is only natural to assume that the majority of these men are workers in and around the coal mines.

Leaving the mine, they go in quest of drink for which they squander their money. But that is not the worst, and before returning home they are leached by men and women who make their living by many nefarious vocations and are always found in the vicinity of saloons.

IDLE TALES OF RECORD PRODUCTIONS

It is no uncommon thing, today, to listen to the tale of wonderful production records, which are seldom based on fact, however, but are the dreams of a brain robbed of its power of lucid reasoning while under the influence of "John Barleycorn." If all of the coal represented by these claims was loaded into mine cars and dumped into railroad cars for shipment there would be no coal shortage in this country.

While I am not, personally, a prohibitionist, I have seen too often the dread effects of the booze habit, and have yet to observe anything but trouble, sorrow and disease in various degrees, from the slight headache of the "morning after," to the murder committed by a whiskey-crazed man and which invariably brings serious consequences to his entire family and deepest sorrow to those bereaved, to say nothing of the expense imposed on the state and municipality where the deed occurred.

Practically, the only excuse for the manufacture and sale of intoxicating drink is the revenue derived from the business, which I am glad to say is on the decline. Being a nation founded on the government by the people and for the people, it seems to me that a failure to stamp out this evil will be a detriment to the many. The few people who are engaged in the business of making and selling liquor reap their profits at the expense of homes and sorrowing women and helpless children, who are deprived of their rightful support. The country, moreover, is deprived of tons of coal, which is badly needed, at the present time, in support of the army of sturdy fighters we have sent overseas.

Let us strive, then, to make our mines greater producers, by installing better machinery where needed and encouraging our men to turn a cold shoulder to old "John Barleycorn" and, if possible, run him out of the country.

OBSERVER.

Huntington, W. Va.

Americanizing the Foreigner

Letter No. 6—Referring to the letter of "Experience," which appeared in *Coal Age*, Aug. 8, p. 286, regarding the assumed hopelessness of educating the foreigner and causing him to adopt American ideals and customs, permit me to challenge the remarks contained in that letter and others that have followed.

For the past four years I have devoted my entire time to community work in coal camps, and have had many dealings with people who have come from other countries. These people are naturally suspicious of strangers, and in many cases their suspicions are well founded, but when they are convinced that you come to them as a friend, their response is most gratifying.

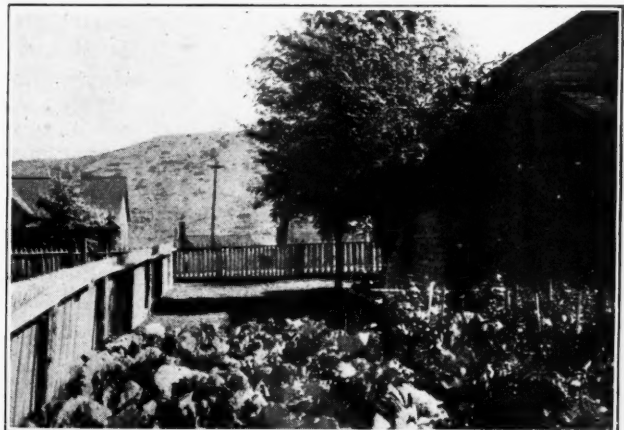


FIG. 1. A MODEL SLAVISH MINER'S HOME

Once you win their confidence, they place in you the same implicit trust that we find in children. Many times, one is almost overwhelmed by the magnitude of their trust. More than once, when some one has been sick and the doctor has changed the medicine a member of the family has come to me wanting me to taste and smell the new medicine before they gave it.

One instance that touched me deeply was that of a Slavish woman who had a two-year-old child who was club footed. The doctor had tried in vain to have the mother send the child to a hospital and have the trouble corrected. I became interested in the case and persuaded the mother to take the child to an orthopedic specialist, who also urged her to send the boy to the hospital and have his feet straightened.

The mother listened to the doctor and then turned to me and said, "I no send my baby for this doctor.

What you say, I better send my baby?" I told her that she should send him. With a look of trust in her eyes that I shall never forget she said, "All right, if you say, I send my baby. I send him, but for no one else, just for you."

The child had to be taken three hundred miles from home and remained there five months. During that time I corresponded with the doctor and kept the mother advised of the child's condition. Her faith all through was most implicit; and I shall never forget the

showed her gratitude by presenting me with the only thing of value that they had in the house. It had been the gift of a priest and was highly prized by the whole family. I tried to persuade them to give me something of less value but found that I could not refuse the gift without deeply wounding the feelings of all. The mother, with tears in her eyes said, "You do everything for me; I give you only my best."

I am sending a recent photo (Fig. 1) of the home of one of our Slavish families. It is not claimed that



FIG. 2. LIVING ROOM AND BEDROOM IN THE SAME SLAVISH HOME

gratitude of the whole family when I brought the little fellow home. His feet were straight and the family was extremely proud of him, because he had learned to speak English very well for a small child.

If space permitted me to tell of all my experiences I could give instance after instance that would show the confidence and gratitude of these friends who have come from across the waters. One Italian woman whom I assisted through a long siege of sickness and need,

all foreign homes are as well kept as this one, but many of them are. I chose this one as an illustration, because the woman was thirty-two years of age before she left the old country, and, the older people are, the harder it is for them to change their habits of living.

In Fig. 2 is shown the living room and the bedroom of the same house. These pictures were all taken about 9:30 one Monday morning. The woman did not know that I was coming or would take the pictures and the



FIG. 3. (1) FOREIGN CHILDREN WITH LIBERTY BONDS.
(2) CLEAN-UP DAY IN CAMP

(3) GIVING DENTAL INSTRUCTIONS
(4) COMMUNITY BAND AT PRIMERO, COLO.

house was not staged for the occasion. I asked her not to change a thing and she continued her washing while I took the pictures, which speak for themselves and show that, in her fifteen years of residence in this country, many American ideas have been adopted. It is quite a step in advance when foreign-born people discontinue raising vegetables in the front yard and make a lawn and plant flowers.

As a rule the beds of the foreign people are very clean. If you have occasion to visit a home where there is sickness you will usually find the bedding spotless, and the sheets and pillowcases trimmed with hand-made lace. I do not claim that this is always the case; but it is true in the majority of their homes. There is a well known American type of family that is far less particular than the average foreign woman.

Since the war started, we have found these people very ready to respond to every call made upon them. Their donations to the Red Cross, Y. M. C. A. and other war organizations, their subscriptions to Liberty Bonds and War Savings and Thrift Stamps have been most generous, and show that they have a real interest in their adopted country.

COMMUNITY WORK CONDUCTED BY THE COLORADO FUEL & IRON CO.

During the last four years I have had charge of girls' summer camps. Over four hundred girls have attended these camps, and over sixty per cent. of them came from foreign families. It has been remarkable how quickly these girls avail themselves of every opportunity offered them and the improvement they make is very rapid. They do not want to appear different from the American girl, and are ever on the alert to imitate them. They are always ready to help, in work or play, and have what we consider a good camp spirit.

In Fig. 3 is shown a group of children, only one of whom is American. These children own over \$1200 worth of thrift stamps and war-saving stamps. One child alone whose mother is German and father Italian has filled three books with these stamps and has now started on her fourth book.

In the next picture is shown another group of foreign children who have collected the pile of rubbish shown, from their yards and the street, in an effort to clean up the camp on what was known as "clean-up day."

In the third picture is shown the dental nurse of the Colorado Fuel & Iron Co. instructing a class of six children—two Americans and four foreign—in the proper care of their teeth. Notice the likeness of dress in the foreign and American children.

In the fourth picture is shown the community band of the Colorado Fuel & Iron Co., at Primero, Colo. Many of the band members are foreigners by birth. The company does all in its power to encourage every department of community work and much success is attending its efforts.

Let me say, in closing, that I do not wish to create the impression that community work among foreigners is always easy and that one meets with no difficulties. At times, I become discouraged and wonder if it is worth while. But, in every walk of life, the things that are worth doing require perseverance and the ability to overcome obstacles.

Habits that have been long formed are hard to change, and we must not expect people coming from other countries to immediately forsake all their customs and habits of living. The process will be slow and gradual; but in time we shall reap the harvest if we faint not. The spirit with which one goes into this work and the amount of tact he or she possesses, together with the ability to read human nature are the determining factors that govern the degree of success a worker attains in this service.

MIRIAM C. DAWLEY,

Community Secretary, Colorado Fuel & Iron Co.
Primero, Colo.

Reminiscences of a Life-Long Friend

I was deeply interested in reading the obituary notice of W. J. Murray, vice-president and general manager of the Victor-American Fuel Co., which appeared in *Coal Age*, Oct. 3, p. 643, and beg to add a few words recalling a friendship the memory of which forms some of my pleasantest recollections.

Mr. Murray's death occurred while I was away on a trip in the northwest where I had little opportunity to see the daily papers. The notice of his demise published in *Coal Age* is the first intimation I have had of the sad event, which brings to me a flood of memories.

It so happened that I was resident engineer at Sopris, Colo., when Mr. Murray entered the service of the Colorado Fuel Co., of which J. C. Osgood was president. The company had leased and was operating the Smith anthracite mine, up the mountain, 4 miles from Crested Butte. There I wintered 1887-8, going to Sopris in the spring of 1888, to take charge of the construction of a permanent tippie and coke ovens that the company were to build at that place.

The superintendent at Sopris, whose name I do not recall, had formerly had charge at the Crested Butte mine where Murray was firebossing, and in that way had formed his acquaintance. Later, as the Sopris mine developed, Murray was made mine foreman at Sopris. That was in the summer of 1888 (not 1887 as stated in the obituary mentioned). A few months after Murray arrived, the superintendent took sick and died.

RAPID ADVANCEMENT OF A SELF-MADE MAN

The new tippie was now finished and Mr. Murray was appointed superintendent of the Sopris mine. I recall, now, the rapid development that took place, and how the output soon reached 1200 tons a day, which was then considered an enormous showing.

Murray was working very hard at that time to achieve an education; and I suppose, because I helped him a little in certain ways, he became quite attached to me and I to him, owing to the characteristics you have so vividly described. If I remember correctly he had had little or no opportunity of attending school when a boy and I think it was not until after he was married that he could write his name. I believe he gave credit to his wife for inspiring him to take up some studies, and he worked at them hard. At the time when I first knew him, he was quite a student of mining literature.

I recall a rather amusing episode, which he often related with considerable glee, of how he arrived in

this country, at Baltimore, as a green countryman. On coming off the steamer, he saw for the first time a large and able bodied negress who so amazed him that he stopped and stared open-mouthed at her until she gave him such a slap on the jaw that it knocked him over. Like nearly all old country miners he had, in his youth used liquor freely. As many know, it was a custom for men to drink Saturday and beat their wives.

As I stated before, Mr. Murray had become a fireboss at Crested Butte and evidently a very efficient one, as that was a very gaseous mine. At one time, I think he had been drinking and was discharged. A bad gas explosion occurred some days later, which struck home to him and he made a resolution not to drink liquor in excess again, and so far as my knowledge goes he kept his resolution faithfully. As he was considered a most able man, the old Colorado Coal and Iron Co. reëngaged him as fireboss and subsequently he went to Sopris.

THE TEST THAT COMES TO THE SUPERINTENDENT

Murray's first trial came soon after his appointment as mine superintendent, at Sopris. There was a strike that threatened to be bad. From the company's standpoint, it was unjustifiable. It was thought to have been started by the "Molly McGuires." One of the episodes occurred when Murray, resenting an insult from a foreign miner, leaped on him, in the office; the miner shot at him but missed and Murray knocked him out. It was a rough and ready part of the country at that time.

I was thrown very closely in touch with Murray, not only during my regular connection with the Osgood interests, in Colorado, but subsequently when I visited New Mexico and Colorado, on consulting work. He was one of the squarest, true-blue men I have ever met and it is a sad thought to me that I will not see him when I go west, as formerly.

GEORGE S. RICE,

Chief Mining Engineer, Bureau of Mines.

Washington, D. C.

Cost Accounting in Mine Haulage

Letter No. 1—In connection with the discussion of the proper accounting of supplies and materials used in the mine, and the excellent letter on that subject, by J. Kenvin, which appeared in *Coal Age*, Oct. 17, p. 754, permit me to suggest that a like consideration of the costs of maintaining and operating mine haulage systems would prove equally interesting and helpful.

We read a lot about haulage systems and haulage costs, but we seldom see a mine haulage system fully analyzed and the cost of its operation fully described. I fear that oftentimes charges are made against the haulage account that logically belong elsewhere.

It is much the same as with a manufacturer or merchant who has no regularly laid out system of accounts, but charges a certain expense to one account, one month, day or week, and the the next time it appears in another column. As a result, the manufacturer or merchant never really knows the unit cost of his product or the turnover of the goods.

Again, the various items, in mine haulage, are considered in a different light by different operators, or I should say, bookkeepers, and a burden is thrown on some divisions that should be borne by other activities.

For example, take the question of what power is consumed in the main line haulage, extending from the different gathering points to the tippie or shaft bottom. Some companies simply guess that a certain percentage of their power is consumed in that service, and the assumed percentage may be low or high.

Others try to approximate this charge or cost of hauling the coal from the gathering stations to the shaft bottom or tippie, by estimating on the rated consumption of the motors. That method, at best, is a wild guess, as no account is taken of the line and feeder losses and the return losses are a forgotten item.

Some companies have realized the tremendous losses occurring in the return, and are attempting to bond the rails which will assuredly save a great deal of money and help to keep the coal moving much more steadily. But the vast majority of companies have no definite idea as to the several items of cost.

It is possible to figure the cost of charging storage-battery locomotives, and the cost of repairing them and trolley locomotives; but how many keep an accurate record of the labor, material and other sundry charges that go to make up the total upkeep cost?

The wages of the motormen are easily computed and charged, but few companies indeed actually charge to their haulage account the upkeep of cars, track and locomotives, cost of lubricant and the oilers' wages. When all these are combined properly, the charge assumes a very pretentious size and is one that is vitally associated with the cost of production.

HAULAGE CHARGES PROPERLY CLASSIFIED

Haulage charges should be divided into gathering and main-haulageway service. One can be excessive, carrying the burden of the other. Both, however, should be very vital to every man who is producing coal, and yet how many have even a slight knowledge of these respective costs? A searching investigation, would, I am afraid, disclose a woeful lack of definite knowledge, and no industry can properly function or produce adequate returns unless every expense item is known and, what is more important, really appreciated.

A good system of haulage accounts, it must be admitted, will not remove the losses due to the stalling of motors by trips of stiffly running, plain-bearing mine cars; or the excessive labor due to bad tracks, or rails that are too light, broken wheels or axles, which cause wrecks; but the right kind of accounting system will enable the progressive operator to save many petty losses, as well as major ones; and the knowledge to be gained by a study of a chart of haulage costs is almost beyond imagination.

I must confess to being greatly at sea, after hearing many ideas as to what should comprise legitimate haulage costs; and I sometimes believe that there cannot be a perfect or universal system, because the conditions are so different in every mine in respect to mileage, grades, etc.

There are, unquestionably, some sound rules that have been subjected to the rigid examination of men who know what they are doing; and some sheets or cards have been designed to cover the subject fully, with necessary report blanks for subordinates to use when submitting their reports; but who has ever seen them published? Very few of us, I am sure. This is a subject

that can and should be discussed, in the columns of *Coal Age*, by superintendents, electrical engineers, and last but not least, by the auditors of our companies.

Auditors have a vast fund of information that would be helpful to many. Their knowledge and experience, coupled with the knowledge and experience of the actual operating officials, who are face to face with these problems, day in and day out, would make very interesting reading and fulfill a long felt want in coal mining literature.

I have written at such great length, because this subject is one of the most vital with which the coal industry has to contend; and a thorough knowledge of all of the conditions and circumstances that affect it would very largely tend to put the company on a better basis.

W. Va.

PROGRESSIVE.

The Miner and Safety

Letter No. 2—I was pleased to read the excellent letter of M. H. G., *Coal Age*, Oct. 10, p. 707, in which he illustrates in a vivid manner the little regard that the practical miner has for his own safety and describes how such a one "passes up" things that are really dangerous, depending on his mining experience to carry him through safely. I was glad to see that the writer of the letter agreed with my suggestion that it is the experienced miner who is the most frequent victim of serious accident. In many cases, the practical miner resents being told what he must do to make his place safe and, as a result of his independence and disregard of instructions given him by the foreman, he is often fatally injured.

The safety of miners is a most important topic, and anyone who is interested in the work of coal mining should concentrate his thoughts upon what relates to safety, as much as he does upon the production of coal. As we all know, accidents are unavoidable in many cases. However, a large proportion of the accidents due to falls of coal and rock, at the face, can be avoided by the constant and close inspection of each working place by the foreman and obedience to his instructions on the part of the miner. The main point, for a person who has charge of men, is to familiarize himself with each and every cause of accident and then drive them home by impressing them on each man working under him. Foresight, on the part of the foreman and the miner, is one of the chief elements relating to safety.

CONTEMPT OF THE EXPERIENCED MINER FOR SAFETY

It would be amusing, if it were not for the serious results that follow, to pass along a gangway where probably 20 or 30 miners are working, and listen to the remarks of the practical miner regarding another who has less experience but who exercises more care to keep himself safe. One hears the remark, "Yes, John is a pea-coal miner; he's a big greeny." But, going into John's place, you find him hard at work, with a good prop standing near him, which he has just set to give better support to the roof above him. Unlike the practical miner who ridiculed him, John is willing to listen to instructions and obeys them promptly.

Ask the practical miner to sound his roof, and his answer is, "It's as safe as if you were outside." On

close inspection, however, the foreman discovers a small crack, which justifies his suspicion aroused by the looks of the place. Yet, sounding the roof with the pick gives no indications of its being unsafe, and you have to insist on the man stopping work and setting a post with a good cap crossing the crack in the roof at right angles. A few more cuts taken from the face prove that the foreman's foresight saved the miner.

CAUSES OF ACCIDENTS THAT SHOULD BE AVOIDED

Let me refer, here, to a few conditions that lead to accidents. For example, obeying the instructions of the foreman, a practical miner reluctantly sets a post in the center of his place. A little later, the post is discharged by a blast, and the miner, on returning to the face, starts to load his coal and neglects to reset the post, until he thinks the foreman will be around again. But, before that time, the unfortunate is caught by the fall of the loose slab.

The places that are usually the hardest to keep safe are those where the roof is a slab formation, and the slate falls in pieces from 6 to 10 in. in thickness. Such a formation is what is known to the miner as "a rider." I have watched men of many years' experience work under such top for a distance of 6 or 8 ft. without attempting to protect themselves.

Told to stop work and take the piece down, the miner invariably replies, "I just tried it and can't get it down." You answer, "Well, try it again." To satisfy you, he prods the piece a little, but makes no great effort to loosen it. A little assistance of the foreman and the slate falls with a heavy crash. Notwithstanding the fact that you have saved the man from possible death, he grumbles that you have dirtied his loose coal, stating that it will take some time to clean it, which is his only excuse for taking the chance he did.

FOREMAN INSISTS AND SAVES MINER

Just recently, I visited a miner's chamber and found that he had taken two cuts from the face, which left a piece of rock 8 in. thick, 5 ft. wide and 9 ft. long, unsupported above where he was working. My request that he should sound the roof brought the reply, "Oh, it's all right; I will pull the piece down when I take the next cut." The foreman insists, "No, try it now, get your drill." The result was that the piece fell heavily on the first touch or pull. Questioned as to whether he had tried it before, the man replied, "Yes, and it was all right." That man had 12 years of mining experience and, had he been caught, the foreman or assistant whose duty it was to inspect his place would have been held responsible for the accident.

Another condition requiring close inspection is where the miners are required to set their posts from 4 to 6 ft. apart, along the face. The practical miner is prone to be careless and will often advance more than this distance, without setting any temporary supports. In that case, the chances are that he may be caught by a slip in the roof that does not appear until too late and the fall takes place, catching the miner.

Let us hope that the discussion of these questions in *Coal Age* will make the practical miner more careful for his own safety. Practical experience is the most essential element in the safe mining of coal; but the miner must cooperate with his foreman.

Kingston, Penn.

LEWIS R. THOMAS.

INQUIRIES OF GENERAL INTEREST

Reversing an Electric Motor

Some trouble with the electric generators at our mines recently started a dispute between the mine electrician and myself as to whether reversing the leads on the switchboard at the power house would reverse the direction of the motor on the locomotive in the mine. The power appeared to be traveling in the rails instead of on the trolley wire, which seemed to be the return. The electrician claimed that changing the switchboard leads at the power house would change the direction of the current in the circuit and reverse the motor in the mine, while I held that it was necessary to use the reversing switch on the machine, which would change the flow in the field in order to reverse the motor. Kindly settle our dispute by explaining fully what is required to reverse a motor in a mine.

East Millsboro, Penn.

ASSISTANT FOREMAN.

An arrangement that would permit the power to travel on the rail and the current return over the trolley wire is unusual and poor. In order to make

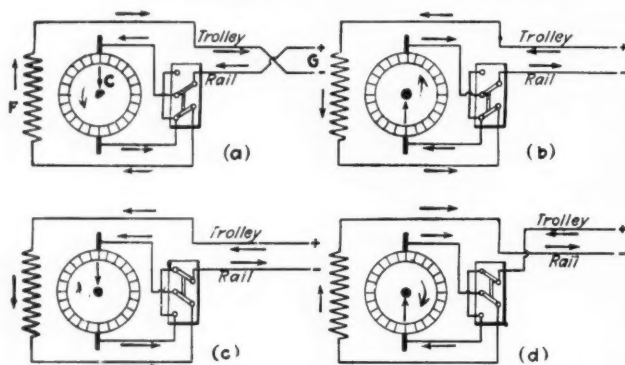


FIG. 1. ILLUSTRATING REVERSING A MINE MOTOR

the situation clear, we have drawn Fig. 1, showing four arrangements, *a*, *b*, *c*, *d*, which we will explain.

The first arrangement (*a*) shows the original condition described in the inquiry, where the power is traveling on the rail and the current returning by the trolley wire. The letters in this figure apply to all the figures alike; *G* indicates the leads at the switchboard of the generator in the power house, the positive lead being the power line and the negative one the return; *C* is the commutator of the armature, *F* the field and *S* the reversing switch of the motor. Observe carefully the direction of the current passing through the armature and the field, as indicated by the arrows.

The second arrangement (*b*) shows the change that takes place when the current is reversed at the power house. The power is now traveling on the trolley line, as it should, and the rail is the return. Observe that the position of the reversing switch on the locomotive has not been changed. Changing the leads at the power

house has changed the direction of the current throughout the entire circuit, including the flow through the armature of the motor and the flux in the field; but the direction of the rotation of the armature, as indicated by the arrows, is the same as before.

The reason the motor is not reversed is that the flow through the armature and the flux in the field have both been changed, and counteract each other. In order to change the direction of rotation of the armature it is necessary to change the direction of either the flow of current through the armature or the flux in the field, but not both.

In the third arrangement (*c*), the current from the generator follows the trolley line and passes through the field of the motor before reaching the reversing switch on the locomotive. This switch is now reversed, which changes the direction of the flow of current through the armature only, and causes it to revolve in the opposite direction from its previous rotation. Notice, however, that the flux in the field remains unchanged.

The fourth arrangement (*d*) is drawn simply to show a different connection from that just described. Here, the power passes from the trolley line directly to the reversing switch of the locomotive and through the armature, before reaching the field, which has the effect of altering the flux in the field, while the flow of current through the armature is the same as that in the second case. This also reverses the rotation of the motor, as indicated by the small arrow.

Reference to Fig. 2 will make clear the fact that changing both the direction of flow in the armature and the flux in the field will not alter the direction of motion, or reverse the motor. In the figure, the thumb and first two fingers indicate respectively the direction of rotation of the armature, direction of the flux or lines of force generated in the field and direction of the current in the armature, the left hand being used.

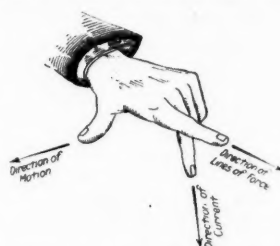


FIG. 2. RELATION OF THREE FACTORS IN ELECTRICITY

Now, it is clear that if the hand be turned about the thumb as an axis, through an angle of 180 deg., both the direction of current in the armature and the flux in the field will be changed, while the direction of rotation remains the same. On the other hand, let the hand be turned about either of the fingers as an axis, through 180 deg., so that either the flow of current through the armature or the lines of force in the field is changed, but not both, and the effect is to change the direction of rotation, as indicated by the thumb.

The right hand is used when it is desired to illustrate this principle in reference to a generator in which the construction is identical with that of a motor but the conditions of operation are reversed.

EXAMINATION QUESTIONS

Miscellaneous Questions

(Answered by Request)

Ques.—What are the effects of unequal expansion and contraction in a boiler?

Ans.—Unequal expansion or contraction in the boiler plate causes an excessive strain to be thrown on certain parts, which may cause rupture by the shearing of rivets or open the seams in the boiler plates. At times, bulging or buckling of a plate may result from the undue strain thrown on that part of the boiler.

Ques.—What care should be taken of boilers to secure the best results?

Ans.—Steam boilers should be thoroughly cleaned, at regular intervals, and all sediment and scale removed. Where the feedwater contains sediment, the boiler should be blown off regularly, at sufficiently short intervals to prevent the accumulation of the sediment in the bottom of the boiler. The smoke flues should also be cleaned regularly and kept free from deposits of soot. All parts of the boiler should be inspected at frequent intervals. The boiler should be fired in a proper manner and the water level never allowed to fall too low and expose the fire plates to injury through overheating. The feedwater should be heated before being admitted to the boiler.

Ques.—How would you fire a boiler to get the best results from it and from the coal used?

Ans.—Best results are obtained when firing is performed by what is known as the "coking method." In this method, the fresh coal is piled up on the front half of the bed and allowed to become well ignited before it is spread over the remaining surface of the fire. By this means, the gases are distilled from the fresh coal and pass back over the fire. In this way, a more even regular heat is maintained in the furnace than when the fresh coal is spread over the entire surface of the bed, which would dampen the fire and reduce the temperature in the furnace. In the coking method, the gases distilled from the fresh coal at the front of the furnace, meeting with the hot air that rises through the bed of coal, are burned and maintain a high temperature in the furnace.

Ques.—State generally what is meant by expansive working and condensing, as applied to steam engines.

Ans.—The steam works expansively in the cylinder of an engine when the valve cuts off the supply of steam before the stroke is finished. The expansion of the steam remaining in the cylinder then performs the work, during the remainder of the stroke. This is known as working the steam "expansively."

A steam engine may be either noncondensing or condensing. In the former case, the engine exhausts into the atmosphere, and the movement of the piston is then opposed by the atmospheric pressure. In a condensing engine, on the other hand, the exhaust steam passes into a condenser where it is condensed and produces

more or less of a vacuum, whereby the back pressure on the piston is reduced during the return stroke.

Ques.—The piston speed of an engine is 600 ft. per min.; what is the length of the stroke if the engine is running at 150 r.p.m.?

Ans.—In this case, the piston travels $600 \div 150 = 4$ ft. during each revolution of the engine; and, since the engine makes two strokes each revolution, the length of the stroke is 2 feet.

Ques.—The diameter of an engine cylinder is 10 in., the length of stroke, 15 in. The engine makes 250 r.p.m., and the mean effective pressure is 40 lb. per sq. in. What is the horsepower developed?

Ans.—The sectional area of the cylinder, in this case, is $0.7854 \times 10^2 = 78.54$ sq.in. At a speed of 250 r.p.m., the engine makes 500 strokes per min., 15 in. or 1.25 ft. long. The horsepower developed in the cylinder is,

$$H = \frac{plan}{33,000} = \frac{40 \times 1.25 \times 78.54 \times 500}{33,000} = 59\frac{1}{2} \text{ hp.}$$

Ques.—What thickness of boiler plate would be required for a boiler carrying 100 lb. pressure, the diameter of the boiler being 6 feet?

Ans.—Estimating the safe tensile strength of the boiler plate at 10,000 lb. per sq. in., the required thickness of the shell, for a diameter of 6 ft., to withstand a boiler pressure of 100 lb. per sq.in. may be calculated by the formula,

$$t = \frac{pd}{2S} = \frac{100(6 \times 12)}{2 \times 10,000} = 0.36, \text{ say } \frac{3}{8} \text{ in.}$$

Ques.—How much water is evaporated per hour per horsepower, under ordinary conditions?

Ans.—In steam-boiler practice, the horsepower of a boiler is given as the evaporation of 30 lb. of water per hour from a feedwater temperature of 100 deg. F. into steam at 70 lb. gage pressure; or, in other words, 1 boiler horsepower is equivalent to $34\frac{1}{2}$ units of evaporation, which means the evaporation of $34\frac{1}{2}$ lb. of water per hour, from and at 212 deg. F.

Ques.—What is the temperature of steam in a boiler when the pressure is 100 lb. per square inch?

Ans.—The temperature of steam varies with the absolute pressure in the boiler, and must be taken from steam tables. For a gage pressure of 100 lb. per sq.in., at sea level, which corresponds to an absolute pressure of, say 115 lb. per sq.in., the temperature of the steam, as taken from the steam tables, is 337.86 deg. F.

Ques.—At what speed would you consider it desirable to hoist men in a shaft?

Ans.—The speed of hoisting men in a shaft will depend chiefly on the depth of shaft and the kind and quality of the hoisting equipment. For a depth not exceeding 100 yd., men should not be hoisted at a greater speed than 20 ft. a sec. In deeper shafts, with up-to-date equipment, the speed of hoisting may reach 40 or even 50 ft. per sec., depending on the depth of the shaft, and the capability of the hoisting engineer.

COAL AND COKE NEWS

Harrisburg, Penn.

Work has been started by the Workmen's Compensation Board to put into effect plans made for the rehabilitation of men crippled or otherwise injured in industry, with a view of returning them to active work. Announcement was made on Oct. 31 by Harry A. Mackey, chairman of the board, that a personal canvass has been started of every compensation award made in recent years to find what progress toward restoration has been made by recipients of compensation. Recommendations will be made to the next Legislature by the board that at least three hospitals equipped for rehabilitation work be constructed and maintained under state auspices, one in Harrisburg, one in Pittsburgh, to take care of the bituminous field, and one somewhere in the anthracite region.

Uniontown, Penn.

Mines, coke plants and railroads have been affected by the epidemic, but the railroad situation cuts more deeply into production than the lack of labor in the mines and ovens. The traffic congestion caused by short crews reached its crest during the week, but was not cleared until the region spent an entire day in idleness and a week of reduced effort. The fuel administration records shows a total car shortage for the week of 1143, the most serious car shortage since last winter.

The total coal output of the Connelville region for the week ended Oct. 26 is placed at 686,152 tons, of which 451,635 tons was manufactured into 301,090 tons of coke and 234,517 tons was shipped to byproduct and other industries.

Warren S. Blauvelt, coke director for the Fuel Administration, this week sounded a slogan of "Quality First" in the fuel campaign in a stirring statement issued to operators and producers of the Connelville-coke region. Mr. Blauvelt declared that inasmuch as the campaign was being waged to increase the production of iron and steel for war needs, quality must be all the more emphasized, contending that "any sacrifice of quality of coke to quantity in order to get a greater quantity will absolutely defeat this purpose." He declared that an increased production of 5 per cent. if accompanied by even a slight depreciation of quality due to excessive ash, poor structure, large percentage of fines and dirt might easily lead to a 10 per cent. increased consumption of coke per ton of pig iron and a decrease of 20 per cent. in blast furnace output.

Charleston, W. Va.

The mines of the Fairmont district are partly out of commission and production has fallen far behind. While the influenza is to some extent responsible for curtailed production, yet the operators of the district charge that the B. & O. is making no effort to supply the district with cars and that the car deficiency is now over 7000. The daily production loss is running as high as 35,000 and 45,000 tons. On last Saturday (Oct. 26) alone there were 4894 men without work and a number of the mines were shut down. Instead of getting 1400 cars a day needed for all the mines, not more than half that number of cars have been furnished recently. For the last three days of last week there were only 2263 cars furnished the district—on Thursday 965, Friday 598 and Saturday 700.

Overcoming many obstacles, the Tug River and Pocahontas district mines have managed to keep production almost up to the high point reached the latter part of September. In other words, the shipment of coal is now hovering around 465,000 tons weekly. Up to and including Oct. 25 the total shipments from the Pocahontas and Tug River districts had reached 1,407,950 tons. As the quota the two districts had expected to reach in October was 2,000,000 tons, it is hardly likely the month's quota will reach that figure, since the daily shipments are in the neighborhood

of 65,000 tons only; but it is believed that had not the influenza disarranged all plans, it would have been a record-breaking production month.

Even with influenza making its appearance at many new points in the Kanawha district the mines of that district in the aggregate had a much larger output for the week ending Oct. 26 than they had during the preceding week. A better supply of cars is responsible for the increase, influenza among C. & O. trainmen having abated to some extent. The increase in output amounted to 32,000 tons, the total production for the week ending Oct. 26 being 180,363 tons as against 148,000 tons for the week ending Oct. 19. Total hours worked reached 5478. There was a shortage measured in hours of 185, due to an inadequate car supply, and a shortage of 1331 hours for which inadequate man power was responsible.

Production took an upward trend in the Winding Gulf region during the week ending Oct. 26, an excellent car supply making this possible in part, the Virginian Ry. keeping a constant stream of empties flowing into the district.

To the surprise of many there was an increased output in the New River and Winding Gulf districts last week, the increase amounting to 12,648 tons for the two districts, or in gross tons, 4562 in the Gulf district and 6711 in the New River district. This was surprising because of the prevalence of influenza in both districts, affecting in some instances 50 per cent. of the men and their families. A car shortage on the C. & O. resulted from influenza among the trainmen.

Birmingham, Ala.

Every coal company in the Birmingham district reports more or less deflection in production by reason of the influenza epidemic. Not only is the coal output being disturbed and greatly lowered, but coke manufacture, iron-making and oven operations at steel plants, machine shops and foundries are being affected. For the week ending Oct. 19, coal production in Alabama was 323,310 tons, the lowest since the Government has been checking up the work. It is expected that when the Federal figures for the week are published, the output will be still lower than that of the week previous.

A. H. Carpenter, well known in coal circles, has been appointed assistant to Production Manager H. C. Sellheimer. He will keep watch on the coke production, and will endeavor to bring about increased output at the ovens with a cleaner run of coke. It is intended to organize the forces as in the coal department, so that labor will understand the need for patriotic efforts and loyalty to the Government in striving for an increased production. There is need for every ton of coal and coke that can be manufactured for many years to come, experts say, whether or not the war ends speedily.

While the influenza epidemic hit the railroads as much as it did other corporations, the reports of the past week as to transportation business are good. Of course, the mining sections showed a considerable falling off in shipments, but these will pick up as soon as the disease has been checked.

Transportation on the Warrior River is progressing steadily enough, much bunker coal being shipped to Mobile and New Orleans, where there is an increasing demand for this kind of fuel. The trade is handicapped, however, by the lack of barges.

Victoria, B. C.

Canada's winter coal supply is receiving close attention at the hands of the Canadian Fuel Administration, at Ottawa, Ont., and it is believed that as a result of organization and of well-disseminated and educative propaganda the people of the Dominion will get through the cold months without undue hardship.

For the purpose of facilitating the equal distribution of anthracite coal in Canada during the winter a further order-in-council has been passed by the Dominion government at the instance of Fuel Controller

C. A. Magrath. The regulations contained in this order are designed to prevent disproportionate deliveries of anthracite to large consumers at times when the household cannot be supplied, the fuel controller being given the right to prohibit entirely, or to limit in any manner he may deem advisable, the use of anthracite coal in any building. This does not apply to private houses using less than 40 tons of coal annually. This law will be enforced through the fuel administrators of the various districts or, in the event of there being no such official, direct from Ottawa by the fuel controller. Infractions of the ruling may be punished by heavy penalties.

A complete list of the Provincial Fuel Administrators follows: Prince Edward Island—J. A. Macdonald, Carrigan, P. E. I. Nova Scotia—R. H. MacKay, New Glasgow, N. S. New Brunswick—Dr. James H. Frink, St. John, N. B. Quebec—H. M. Marler, Standard Building, Montreal, P. Q. Ontario—R. Home Smith, Harbour Commissioners' Building, Toronto, Ont. Manitoba—J. A. Macdonald, Winnipeg, Man. Saskatchewan—T. M. Molloy, Regina, Sask. Alberta—John T. Stirling, Edmonton, Alta. British Columbia—N. Thompson, Vancouver, B. C.

PENNSYLVANIA

Anthracite

Wilkes-Barre—W. S. Sprague, of this place, has submitted to the Department of Mines of Pennsylvania for its approval a sample of a specially treated paper for brattice use. It is claimed that this paper will not burn and is being successfully used in a number of mines.

Minooka—The Lackawanna Coal Co. has placed a force of men at work making repairs to St. Joseph's Hall here, which was recently quite badly damaged as a result of mine settlements. When the repairs are completed and the heating plant is put in condition the building will be used as an emergency hospital for miners and their families.

St. Clair—Cheap fuel for a century to come is in prospect for the Reading Ry. as a result of experiments successfully completed recently on the run between St. Clair and Philadelphia. Locomotive 1717 was fired for a series of runs with a mixture of culm and bituminous, in the proportion of 65 per cent. for the latter and 35 per cent. of anthracite culm. The combination worked so well, it is stated, that steam pressure of 210 lb. was maintained for the entire run. The locomotive was equipped with an automatic stoker, and the officials, to carry the test still further, will now try the mixture hand-shoveled into the engine firebox.

Bituminous

Somerset—H. L. Sellers, of Confluence, has leased and is operating the mine near Draketown.

Savan—A new mine is being opened on the Lowry farm here by Frank Lowry. The coal will be dumped over the new tippie of Lowther & Davis.

Homer City—A switch connection has been made by the Pennsylvania R. R. with the siding of the Myvan Coal Co. just south of Homer City. The new company has purchased about 100 acres of the Upper Freeport coal and it is reported will develop it at once. No construction work, outside of the siding connection, has been started as yet.

Indiana—The Two Lick Coal Co. has abandoned the sinking of its shaft on the property near Indiana until after the war, owing to the scarcity of labor. The shaft was sunk about 50 ft. and had about 16 ft. to go to the coal when abandoned. The new operation was to supply the commercial and domestic coal for Indiana which is now hauled from Yellow Creek and shipped in by rail.

WEST VIRGINIA

Logan—On Nov. 4 the MacBeth Coal Co. began shipping coal from its plant on Rum Creek in the Logan field. The company will take coal from the Eagle Seam, having a 5-ft. vein in which to operate.

Clay—So hard were the mines of the Elkland Coal Mining Co. at Clay hit by the influenza that not enough physically able men were left to man the mines, and consequently the mines were shut down entirely.

Bluefield—A new tippie has recently been put up by the Camella Red Ash Coal Co. at Drill. The same company has also erected a number of houses for miners and a store building. L. G. Little is in charge of operations as superintendent.

Bluefield—Within the last few months the Banner Raven Coal Corporation, with a plant at Drill, has not only put up a new tippie but has also erected 53 dwellings for miners and a clubhouse. It is also adding to the number of miners' dwellings built.

Bluefield—A siding is being laid by the Garden Coal Co. at Drill, to its new permanent tippie. Though the company, of which C. W. Steele is general manager, began shipping coal last February, it was not until recently that the permanent tippie was completed.

Oleott—Construction work on the plant of the Newcourt Coal Co., near here, in the Coal River field, is nearing completion. Coal will be taken from both the Back Band seam and the No. 2 Gas seam. Preliminary work at the company's plant is in charge of W. J. Newenham.

OHIO

Oreton—L. D. Binyon and James Hogan two brick men of Chicago, are developing a stripping operation at Oreton on the Hocking Valley Ry., in Vinton County. A track is being built and a contract has been awarded for a steam shovel with a capacity of 400 tons daily. A part of the coal will be sold through the Columbus Fire Brick Co., Columbus.

INDIANA

Clinton—An explosion in the Vermilion Coal Co.'s mine, northwest of Clinton, seriously burned James Hinkle and James McQueen, shotfriers. It is believed, however, that both men will recover.

KENTUCKY

Madisonville—The St. Bernard Mining Co. is well along with the construction of its new power plant, which will cost more than a half million to complete and which will furnish power and light for eight mines and a number of towns. The plant will be at Loch Mary, near Earlington, and will supply power to the Fox Run, St. Charles, South Diamond, Shamrock, Luten and Victoria mines, serving two or more mines at some of these points. The miners' homes will be taken care of and light furnished for residences in the towns named.

ILLINOIS

Benton—The new coal washer of the United States Fuel Co. at the Middlefork mine was tested out a few days ago in the presence of all of the company officials from Chicago. It cost \$500,000 and is said to be the largest in the world.

Carlinville—Coal was struck in Mine No. 3 of the Standard Oil Co., at Schoper, seven miles east of here, recently, at a depth of 315 ft., 74 working days after the work began. This is said to be a record. The first load of coal was brought to the surface the next day.

Pinekeyville—The body of Joseph Neising, who was drowned in the Gordon mine 39 years ago, was recovered from the mine on Oct. 26, in comparatively good condition, and the funeral was held next day, and was attended by his five children. Neising was drowned Jan. 5, 1880, when Beau-coup Creek overflowed and flooded the mine. All the miners but Neising escaped. No attempt was made until recently to pump it out. When the water was removed Neising's body was found near the air shaft. The cold water had preserved it.

Bellefonte—A standing shot at Eldnar mine Monday, Oct. 28, caused a fire which was only extinguished after an all day fight.

Miners employed at the Richland, Wilder-man and St. Clair mines, on the Illinois Central R. R., have petitioned the Federal Railroad Administration for a train to carry them to and from their work. They say that unless transportation is provided they will have to seek work in other mines.

A coal company which leaves an open keg of powder in a shed is responsible if a pair of meddlesome boys find it and set it off, according to a decision in the Belleville Circuit Court. The Egyptian Coal Mining Co. of Marissa, Ill., was required to pay \$1750 for the death of one of the boys and \$2000 for injuries to the other.

COLORADO

Trinidad—William Caddell, who with Henry Carlson, of Walsenburg, was part owner of the Hezron mine in Huerfano

County, was instantly killed on Oct. 21 by an explosion of gas. Five others were injured, two perhaps fatally. The mine was a former Colorado Fuel and Iron property and was leased by Caddell and Carlson.

Foreign News

Victoria, B. C.—When Hon. Martin Burrell, Minister of Mines in the Dominion government, was in British Columbia recently a delegation of Vancouver Island residents waited on him with regard to the interests of settlers interested in the coal rights of the island. They wanted some statement from the minister as to whether, should the British Columbia government reenact the Settlers' Rights Act of 1917, the Federal authorities would refrain from disallowing it again. Mr. Burrell could make no definite statement but assured his petitioners that he appreciated the importance of the matter from the viewpoint of the settlers, involving as it did title to a considerable proportion of the coal resources of Vancouver Island. He agreed that all those interested were entitled to the fullest hearing by the Dominion government should the matter come up for reconsideration. The Settlers' Rights Act, it may be explained, gave the settlers within the Esquimalt & Nanaimo Ry. belt a specified period in which to make claim to the coal rights within the limits of their property, they then being granted title to the coal, if able to substantiate their claims. The coal areas in question, or at least most of them, now are owned by the Canadian Collieries (D) Ltd.

Personals

George Love, formerly with the Jefferson and Clearfield Coal and Iron Co., at Ernest, Penn., has been made mine foreman of one of the mines of the Coal Run Mining Co. at McIntyre, Penn.

J. H. Schroeder, formerly secretary of the Rutledge & Taylor Coal Co., of Chicago, Ill., has resigned his position with that company, effective Nov. 1, and has accepted the positions of treasurer of the Mason Coal Co., and assistant treasurer of Nokomis Coal Co., with offices at 1380 Old Colony Building, Chicago, Ill.

C. L. Huntzinger, recently connected with the Robins Conveying Belt Co., has accepted the position of mining engineer with the Valier Coal Co., Valier, Franklin County, Illinois. Mr. Huntzinger has developed a method of mining whereby it is expected that the recovery of coal in that district will be largely increased.

Charles G. DuBois has been elected vice president of the Western Electric Co., Inc., of New York, N. Y. Mr. DuBois entered the employ of the company in 1891 at its New York office and occupied successively the positions of chief clerk, secretary and supervisor of branch houses. Mr. DuBois is 48 years of age and was graduated from Dartmouth College in 1891. He resides in Englewood, N. J.

Walter McNichol, of Scranton, Penn., formerly state senator and one of the supervising inspectors of the State Department of Labor and Industry, was on Oct. 29 appointed as chief of the Bureau of Inspection and ex-officio acting commissioner of Labor and Industry during the absence in military service of Col. John Price Jackson. Mr. McNichol succeeds Lew R. Palmer, of Pittsburgh, who has retired.

Obituary

W. J. McIninch, superintendent of the Knoxdale mines of the Loash Coal Co., died Oct. 18 from pneumonia, superinduced by influenza. His home was at Knoxdale, Penn.

John H. Williams, of Pittston, Penn., general inside foreman at the Stevens colliery of the Lehigh Valley Coal Co., died on Oct. 29, following an attack of influenza. Only a week before a son of the deceased was claimed by death. Mr. Williams is survived by his widow and four children.

Frank A. Kearns, superintendent of the United States Coal and Coke Co.'s operations at Lynch, Ky., died at Pittsburgh, Penn., following an illness of five days, dating from the time he left Middletown to attend the funeral of Superintendent W. W. Harding, of the company, at Pittsburgh. Mr. Kearns was born in East Liverpool, Ohio, and was 31 years of age. He had been in charge at Lynch about a year.

Coming Meetings

American Society of Mechanical Engineers will hold its annual meeting Dec. 3-6 in New York. Secretary, Calvin W. Rice, 29 West 39th Street, New York City.

Coal Mining Institute of America will hold its annual meeting Dec. 4 and 5 in Pittsburgh, Penn. Secretary, H. D. Mason, 911 Chamber of Commerce Building, Pittsburgh, Penn.

American Institute of Electrical Engineers will hold its 343d meeting Nov. 8, at 8:15 p. m., in the Engineering Societies Building, New York City, under the auspices of the industrial and domestic power committee. Secretary, F. L. Hutchinson, 29 West 39th Street, New York City.

Industrial News

Springfield, Ill.—The Chicago, Wilmington & Franklin Coal Co. has been sued by Margaret Furry for \$10,000 for damage to her land through the failure of the company to place supports in entries when it took out the coal. She alleges that the surface subsided.

Bluefield, W. Va.—The Sandy Ridge Coal Co., operating at Drill, in Southwest Virginia, will hereafter conduct its operations under the name of the G. R. Carter Coal Co., with G. R. Carter as general manager. A new tippie has recently been built by the company.

Charleston, W. Va.—Under a modification of the zoning regulations nut and slack coal for steam purposes produced in the Coal River, Guyan Valley and Kenova Thacker districts may be shipped into the Lower Peninsula of Michigan.

Uniontown, Penn.—A deed conveying 63 tracts of the Pittsburgh vein of coal to the Pittsburgh Coal Co. has been placed on record by C. E. Lenhart and others, trustees for I. W. Semans, bankrupt. The tracts are located in West Bethlehem, Smith, Strabane and Amwell townships, Washington County. The consideration named was \$766,870.75.

Chicago, Ill.—The Chicago Pneumatic Tool Co. announces the appointment of A. M. Brown as district manager of sales, 1749 Market St., Philadelphia, succeeding G. A. Barden, who remains in Philadelphia as sales representative for the company. For some time past Mr. Brown has been located in the New York offices of the company as assistant manager of the compressor sales division.

Charleston, W. Va.—It is reported that Henry Ford has purchased the properties of the Marmet Coal Mining Co., Kanawha County, and the Otto Marmet mines, Putnam County. It is said the entire output of both operations will be used exclusively for the Detroit and other plants now operated by the Ford company. Controlling interests of both mines were owned by Marmet Brothers, of Cincinnati. The two operations have a daily output of 120 tons.

Toledo, Ohio—Despite the falling off in production in Ohio and West Virginia, due to influenza, activity at the docks at the lower lake ports has been marked. During the week ending Oct. 26 the Toledo & Ohio Central docks loaded 78,000 tons, as compared with 89,000 tons during the previous week. The total for the season is 1,952,000 tons. During the same week the Hocking Valley docks handled 259,572 tons, as compared with 151,780 tons during the previous week, making a total of 4,494,005 tons for the season.

St. Louis, Mo.—Fuel Administrator Crossley and the ten district engineers of the Missouri Fuel Administration had a meeting last Friday at the offices of the St. Louis Fuel Committee and decided upon a basis of classification of the questionnaires sent to industrial concerns last summer. There are to be five classes, based on efficiency and degree of essentiality. Those in the least efficient classes will be given the lowest rank. Those who failed to return the questionnaires will find themselves without coal if a scarcity occurs.

Uniontown, Penn.—F. E. Markell, of Connellsville, Penn., a minority stockholder, has asked for the appointment of a receiver for the Pennsylvania Fuel Co., with offices in Uniontown. He also asked for an injunction restraining the payment of alleged exorbitant salaries to S. A. Carson, of Greensburg, and G. M. Hochheimer, of Uniontown, whom he charges with a conspiracy "to appropriate to themselves the profits and earnings of the corporation." He claims that for 1917 Carson drew a salary of \$14,750 and Hochheimer \$22,000 during the same period.

MARKET DEPARTMENT

Weekly Review

No Fears Entertained So Far As Soft Coal Is Concerned—Influenza Still Limits Production—Large Stocks of Soft Coal Reported at Mines—Many Operations Closed for Shipping Dirty Coal—Anthracite Still a Source of Worry—Small Sizes Plentiful.

SO FAR as bituminous coal is concerned, there is no immediate cause for anxiety. True, the ravages of the influenza epidemic in the coal-mining sections continue to limit production, but so large a quantity of soft coal has been accumulated in storage piles that no shortage is feared in any quarter. In fact, a surplus of coal has been reported from practically all mines west of Pittsburgh, this unusual condition being attributable largely to the possibility of an early peace and partly to the exceptionally moderate weather which has prevailed throughout the country for the past month or more. Developments in the war situation change with such rapidity that manufacturers of certain classes of goods will not keep their reserve stocks of coal at the permissible maximum limit. If, however, Germany should decline to accept the terms of the Allies' armistice, it is expected that the surplus now existing will soon disappear.

During the week ended Oct. 26 the output of soft coal is estimated at 11,215,000 net tons as compared with 11,524,000 net tons for the week ended Oct. 19. The downward trend is traceable directly to the influenza epidemic. Indications point, however, to a return of the gratifying tonnages of a month or so ago, as the disease is now on the wane.

With the urgent need for quantity production of soft coal now somewhat ameliorated, the Fuel Administration is again turning its attention to quality. During the week ended Oct. 28 orders were issued to 13 soft coal mines prohibiting them from mining or shipping their product as it was of an inferior quality. This makes a total of 99 mines closed since the Fuel Administration inaugurated its campaign for clean coal.

Anthracite output during the week ended Oct. 26 is estimated at 1,714,000 net tons, which is exactly the same

tonnage produced during the week ended Oct. 19, but 339,000 net tons below the output of the corresponding week of 1917. The increase in wages which went into effect in the anthracite mines on Nov. 1 will undoubtedly bring back many of the mine workers who left for other industries because of higher wages. With added man power and no epidemic to contend against, an improvement in output can be expected shortly.

While there exists a scarcity of the domestic sizes of anthracite, there is an abundance of the small coals available. In some instances shippers are reducing their prices in order to dispose of their stocks of rice and smaller coals. Household consumers who have not as yet received their quota of hard coal would do well to look into the possibility of utilizing these small sizes, as it has been demonstrated that they can be successfully burned in household furnaces.

WEEKLY COAL PRODUCTION

The influenza epidemic continued to limit production of bituminous coal during the week of Oct. 26, and preliminary estimates place the output at 2.7 per cent. below the week preceding. The output during the current week (including lignite and coal coked), is estimated at 11,215,000 net tons as compared with 11,524,000 net tons during the week of Oct. 19 and 10,804,000 net tons during the corresponding week of 1917. The average production per working day during the week of Oct. 26 is estimated at 1,869,000 net tons and while lower than the preceding week, estimated at 1,921,000 net tons, exceeded daily production during the week of Oct. 26, 1917, estimated at 1,801,000 net tons, by 3.8 per cent.

The decline in production during the past few weeks now makes necessary an average daily production during the balance of the coal year of 2,047,000 net tons, an increase over the daily requirements of approximately 1.6 per cent. and over the average daily production for the coal year to date (1,988,000 net tons) of 3 per cent.

Production of anthracite during the week ended Oct. 26, estimated at 1,714,000 net tons, is exactly the same tonnage as produced during the week preceding, but fell below the corresponding week of 1917 by 339,000 net tons, or 17 per cent. The daily average during the current week is estimated at 286,000 net tons as compared with 334,000 net tons for the coal year to date and as against 332,000 net tons during the same period of 1917. For the period Apr. 1 to date, the total production is estimated at 59,087,000 net tons as compared with 58,789,000 net tons during 1917 or an increase of 0.5 per cent.

Carriers' reports show a decrease a shipments from all districts during the past week with the exception of the district including Cumberland, Piedmont and Somerset, northeast Kentucky and the smokeless fields of West Virginia, southwest Virginia and the district including Iowa, Texas and the Southwest State. Western Pennsylvania, Ohio and the district including Illinois, Indiana and western Kentucky fell behind the most, while the improvement in

the various districts mentioned was slight.

Bituminous coal dumped at lake ports during the week ended Oct. 26 is estimated at 1,036,590 net tons, a decrease compared with the week preceding of 8 per cent. and 5 per cent. compared with the weekly average from July 1 to date. Total bituminous coal dumped at lake ports from Apr. 1 to date now amounts to 26,100,000 net tons.

Production of beehive coke in the United States during the week ended Oct. 26 is estimated at 592,000 net tons, an increase compared with the preceding week of 3 per cent., but a decrease of 2 per cent. compared with the corresponding week of 1917. The average production per working day during the current week is estimated at 99,000 net tons as compared with 95,000 net tons during the week of Oct. 19, and 101,000 net tons during the week of Oct. 26, 1917.

The operators in the Connellsville, Greensburg and Latrobe districts of Pennsylvania report production during the week ended Oct. 26 at 352,287 net tons, and the full time operation of their plants at 73.9 per cent. as compared with 75.1 per cent. during the week preceding. Shortage of coke cars caused a loss of full time of 3.8 per cent. and labor shortage of 19.2 per cent. The same operators produced 225,850 net tons of coal.

During the past few weeks, operating conditions in the byproduct industry varied but little, the operators of the country reporting full time operation of their plants at approximately 90 per cent., the limiting factor being reported as necessary repairs to plants. The operators of the country reporting for the week ended Oct. 26, show production of 577,808 net tons, approximately the same tonnage, as produced during the week preceding. Their plants were operated at 90.7 per cent. of their full time and out of a total loss of 9.3 per cent., 6.4 per cent. is attributed to repairs to plants, a slight increase over the preceding week.

Improvement in operating conditions occurred during the week in Kentucky, Massachusetts and New Jersey. In the former two states, it was due to repaired plants and in the latter state to better

supply of coal. A decline in production is reported by the operators in Illinois, New York and Pennsylvania, brought about by repairs to plants. Increase in capacity in Pennsylvania during the week is due to the completion of new ovens by the Carnegie Steel Co. at Clairton, Pennsylvania.

BUSINESS OPINIONS

Marshall Field & Co.—Current distribution of dry goods is slightly ahead of the corresponding week of 1917. The volume of road sales for immediate delivery was well in excess of the same period last year. Road sales for future delivery were somewhat heavier. There was a marked falling off in the number of merchants in the market. Collections continue good.

Bradstreet's—Trade has decreased, operations for the future are under leash, and conservation tends to assume a more prominent role. Persistent talk of peace is an unsettling factor; the epidemic of influenza has made for noteworthy inroads on final distribution, has deterred country buyers from visiting the larger centers, and the warmest weather experienced in October for more than a generation has held down buying of fall goods from final purveyors. Despite the evident signs of a debacle among the Central European Powers, manufacturing on governmental account and war preparations in general, except in some shipyards, have not halted, nor is there any disposition to let up on essential activities.

The Iron Age—Munitions contracts were first thought of as most sensitive to the approach of peace, but instead the Shipping Board's action has been the barometer. The steps taken as to shipbuilding in the past week mark the passing of this part of the war program from the wasteful stage, in which haste was the first and last word, toward a basis of economic production. The most efficient yards will be pushed to the utmost, but high-priced operations will not long continue. Some plans for shipyard extensions have been given up; but meanwhile the output of ships will increase. Sentiment in the steel trade as

to coming changes runs all the way from an expectation of depression on the making of peace to a prediction that the need in the transition will be not for Government help in price maintenance but in holding prices down.

Dry Goods Economist—During the week the quotations on raw cotton, both for spot and future delivery, have receded slowly but firmly on the New York Cotton Exchange. Spot cotton dropped 70 points on Monday, 35 points on Tuesday, and 60 points on Wednesday. The highest prices for futures on Wednesday were 29.45 cents for December, and 29.10 cents for January. All other quotations were under 29 cents. Orders for supplies for the new United States Army, that is, for the men now being called to the colors, are being supplemented by calls for additional quantities of various items, presumably with the idea of keeping up the pre-determined reserve. The placing of these orders, which were for a substantial quantity of goods, has had the effect of holding up production of considerable quantities of cotton goods needed for commercial purposes.

American Wool and Cotton Reporter—Acting President Samuel G. Adams of the Boston Wool Trade Association has appointed a committee to draw up some plan to make suggestions to the Government as to the method of handling next year's clip. The larger houses have found that they have been unable to make any reasonable profit, if any, on the basis of 34 per cent, the amount allowed by the Government, on the wool sold. Some, it is understood, have even operated at a loss. Mixed opinions are heard in regard to the cotton market, price fixing and peace talk. While statements are made that the South is losing money because of the investigation in regard to the price of the commodity, there are others who feel that over-statement has been made and that a reasonable profit will be realized. The opinion is expressed by some that there will be a larger crop than was expected owing to the excellent weather during the latter part of the season.

Atlantic Seaboard

BOSTON

Opinion general that New England requirements for steam coal are now well cared for. Problem to absorb the coal offered. Race between fuel authorities and larger distributors to see who can get to consumers first. More discrimination as to loading is called for, in order to reduce demurrage charges. Recent instances of latter have climbed as high as \$3. Buyers alarmed over differential between deliveries by water and those all-rail. Movement via gateways still further reduced. "Free coal" the result of wholesale embargoes. All the railroads comfortably supplied. Increasing disposition on part of large buyers now to accumulate only sparingly. Provincial coal receipts show increase for the present. Anthracite receipts all-rail remain on same level. More cargoes loaded for New England lately than for several weeks. Fuel Administration has issued order to retail coal dealers to furnish broken and pea where egg, stove and chestnut are desired.

Bituminous—There is now a distinct feeling among the trade that requirements throughout this territory for bituminous are now amply provided for. To withdraw more ships would doubtless cause embarrassment, but the fact remains that New England consumers by and large have considerably in excess of four months' supply. Public utilities have been well served, and in every direction there are plants that now have in storage more than regulation are supposed to permit. Arguments are put out to influence consumers to take on coal even more liberally, but even the arrangement reported to have been arranged with Holland for 100,000 tons monthly has failed to make buyers here any more enthusiastic about receiving supplies in any heavier volume.

Even coal with minimum charges, as all-rail delivery from central Pennsylvania, is not the ready sale it was a month ago. The embargoes placed through fuel administration channels have raised havoc with the shipping instructions on file with the mines. And yet new embargoes are being placed from day to day. The idea of the fuel embargo was to insure such better distribution that no plant vitally necessary to the war program should be obliged to shut down from lack of coal while other plants less necessary, were well supplied. Now that every plant the length and breadth of this territory has as much probably as can be used the coming winter,

it would seem idle to balk deliveries from mines needing orders to consumers willing to accept coal on the current basis. There will soon be enough deterrent reasons for consumers of their own motion to have shipments suspended. Under present circumstances the coal embargo is obsolescent.

Among the usual distributors in the trade there is much difficulty in placing coal from steamers arriving here. Embargoes have been placed so sweepingly that frequently a shipper has been obliged to parcel out an entire cargo to consignees practically unknown to him, this to the exclusion of regular customers to whom the coal would otherwise have been forwarded on contract.

The whole matter of differentials between water-borne coal and shipments all-rail is to steam-users. All through the season there was a mild sort of pressure among certain of the fuel administration officials to restrict the territory into which all-rail deliveries should be allowed, although more than once the Railroad Administration made authoritative statements that so long as there was no congestion at the New England gateways the matter of car-miles was not important.

Embargoes placed at wholesale have had the effect of forcing something of a tonnage into the open market, particularly from central Pennsylvania, where the embargo has been more often used. Operators who have season contracts with large consumers in this territory find themselves forbidden to make deliveries and in order to place their coal are now being obliged to solicit business from the few consignees who happened to escape the embargo net. There has been a good deal of this coal offering the past ten days. It is a sign of the changing times.

The railroads in New England appear to be comfortably supplied with the exception of the New Haven, which has been repairing and putting into shape several of its larger storage plants. The railroads in this territory have more steam coal on hand than a year ago. One of the smaller roads has nearly five times as much coal as on Nov. 1, 1917.

With all the larger consumers there is an increasing disposition to build up further reserves only very slowly and cautiously. There are many possibilities in the air, and lower marine freights and a reduced price for coal are among them, when it is considered that most of our steam-plants have now on hand coal that will not be used until March or April. Instead of shortage of labor or shortage of cars there may well be next year a shortage of orders.

Among the other receipts of water-borne coal that prove more or less difficult to absorb are certain cargoes of Cape Breton coal that regularly are now seeking a market here. During the spring and summer a certain tonnage of this coal was arranged for through the United States Shipping Board, partly to furnish cargoes for lake-built steamers that were in transit from the St. Lawrence to coast-wise ports. Outside that particular quota the coal was then very hard to get, and it is significant that now a consistent effort is made to furnish consignment for cargoes of this that seem to be arriving with more frequency.

For all-rail movement during October complete figures are not yet available. It may be said however that the past week the daily receipts of railroad fuel have averaged only about 95 cars, while early in the month the average was well up to 150 cars. This shows a notable falling off which is equally pronounced with commercial bituminous. For the same recent period the daily average receipts at the five New England gateways were only slightly over 300 cars. The total receipts of bituminous therefore have lately been only about 400 cars per day, as compared with 750 per day during August.

Anthracite—Receipts of domestic sizes continue about on the level of the past month; namely, a daily average of 400 cars at the five gateways. This is only slightly less than the average for August. More hands at the New York loading piers have helped materially in the tonnage dumped into barges for New England consignees, and more cargoes have been loaded the past week than has been the case at any time since Oct. 1. There are still expensive delays at Port Reading, due largely to the lack of facilities there for loading and handling so many bottoms.

There continues to be a notable shortage of stove and chestnut, practically every retail consignee being obliged to accept a proportion of broken and pea. The result is a pronounced surplus of these sizes, and in certain communities the local fuel committee have been broad-minded and

courageous enough to insist that householders accept what they can burn in their heaters and ranges rather than what they prefer. Finally, the Boston Fuel administration followed suit, and dealers have been ordered to furnish broken and pea instead of egg, stove and chestnut.

NEW YORK

Wage increase creates a better feeling in mining regions and it is believed many workers will return. Coal not moving as freely as desired but warm weather eases consumption. Local dumpings show an improvement. Buckwheat and the smaller sizes plentiful, and consumers who can do so are urged to use buckwheat instead of the larger coals. Bituminous situation easy.

Anthracite—The increase in wages granted the mine workers in the anthracite regions has created a much better feeling, and will go a long way toward inducing many of the former employees who left for other industries because of higher wages and better conditions to return to their former employment. Operators are estimating that several thousand men and boys will be back in their old jobs.

Locally the situation, so far as receipts go, continues to be acute. Coal has not been moving as freely as the trade would wish, but there is no serious complaint inasmuch as weather conditions have not been conducive to heavy consumption. Unseasonable temperatures during the latter part of October eased up coal burning considerably, and this is greatly responsible for the present condition which is good considering that production was further cut by the influenza epidemic.

Receipts here are reflected in the dumpings for the week ended Nov. 1, which show an increase over the previous week, 6425 cars having been dumped as against 5597 the previous week. For the month of October the dumpings were 26,615 cars, as compared with 27,944 cars in September, and 32,494 cars in August, certainly not an encouraging sign as cold weather approaches. However, as dealers point out, the fact that nearly every consumer has more or less coal on hand to tide them over for at least a few weeks, would indicate that conditions are better than they have been in previous years.

With a scarcity of the larger domestic coals, there is an abundance of the small sizes available, and some shippers continue to shave prices in order to move rice and the smaller coals. Those consumers who can do so, and those who can change their grates to burn this class of fuel, are being advised to make the changes because as it is pointed out by the State Fuel Administration they can secure a sufficient supply. The Anthracite Committee has sent out circulars stating that advice has been received that there is no restriction at the present time on the amount of anthracite coal below buckwheat No. 1 that a manufacturer may receive. The State Fuel Administrators have also been authorized to give country clubs the necessary permits to receive and burn bituminous or steam anthracite whenever, in their opinion, there is a surplus of such fuel for that purpose.

Some anthracite dealers are advising their consumers that it is possible for them to burn the small sizes in their household furnace providing they make a bed of ashes.

Current quotations, per gross ton, f.o.b. tidewater, at the lower ports are as follows:

Circular Individual		Circular Individual	
Broken..\$6.75	\$7.50	Buck...\$5.10	\$5.90
Egg.... 6.65	7.40	Rice.... 4.65	5.10
Stove... 6.90	7.65	Barley.. 4.15	4.30
Chestnut 7.00	7.75	Boiler.. 4.60	
Pea 5.50	6.25		

Bituminous—The local situation is favorable. There is plenty of commercial coal to go around, with some to spare, as a result of the unseasonable temperatures that existed a week ago. In fact, stocks with some shippers have been so large within the past ten days that there were fears that prices would have to be cut in order to move the coal. This, however, was not necessary as there was another serious cut in production due to the influenza epidemic.

Some shippers look for a further reduction in production now that the railroads have discontinued giving box cars to operators of wagon mines, the order having gone forth that these cars are needed in the West for the shipping of grain. Wagon mine owners received an allowance of 75c. per ton for loading these cars, which they now lose. What, if any, effect this will have upon production is a matter of conjecture, although some shippers look for a slight reduction in production figures.

The order of the Fuel Administration permitting the local traction and lighting companies to accumulate 100,000 tons of bituminous coal each, in order that there may be no interruption of service this winter, may be the means of cleaning up considerable of the surplus coal here. This tonnage represents approximately 60 days' supply for each of the traction companies, and the accumulation has been authorized where there is risk of interruption of transportation during the winter.

While there is an accumulation of ordinary grades in the market there is a good demand for the better grades, which are scarce, being taken up by regular customers and those who need them for their particular business. Conditions in the bunkering market are not as favorable. Production of the coals necessary for this class of trade have been greatly reduced.

Water shipments to New England and towns along the Long Island Sound have not improved greatly. Efforts are being made to hurry coal forward to these points before the approach of winter weather and the attending transportation difficulties.

Current quotations, based on Government prices at the mines, net ton f.o.b., tide-water, at the lower ports, are as follows:

	Mine Gross	F.o.b. N. Y. Gross
Central Pennsylvania:		
Mine-Run, prepared or slack.....	\$3.30	\$5.45
Upper Potomac, Cumberland, and Piedmont Fields:		
Run-of Mine.....	3.08	5.23
Prepared.....	3.36	5.51
Slack.....	2.80	4.95

Quotations at the upper ports are 5c. higher.

PHILADELPHIA

Anthracite wage increase causes slight stir. Consumers anxious as to their prices. Shipments meager. Companies assure trade of full allotments. Pea plentiful. Stove and nut grow scarcer. Steam coals all slow but No. 1 buckwheat. Bituminous continues plentiful. Good stocks ahead. Market approaching quality basis?

Anthracite—The decision of Dr. Garfield to allow the anthracite miners a wage increase averaging \$1 a day was heralded so far in advance as to cause no particular surprise to the trade. For several days prior thereto it was known that the leading anthracite representatives were in Washington, and it was understood they were figuring out the details of the new mines price for the coal. It was intimated very strongly that the increased wage schedule could be put in effect without a consequent increase in the wholesale price.

So far as demand for coal is concerned, the almost unprecedented mild weather has been an uncomfortable situation. Practically no coal to speak of has come to the city during the past two weeks and the dealers are far from showing the same patience as the public. No fires have been needed and the consumers have been less insistent than in cooler weather.

After interviewing representatives of several of the larger shippers we are strong in the belief that this territory is to be further neglected. Coal is moving west and to tide, particularly the latter, and there are no signs of it being diverted to this market for the present. The shippers show little disposition to advise their customers just what they may expect. The reason for this, we are told, is that so many times their plans have been made only to be upset by some preferential order of the fuel authorities. We are, however, much inclined to believe that the small shipper does not consider himself under the control of the Fuel Administrator to the same extent as the large companies. As proof of this we know of dealers who bought no coal from shippers during the basic year of 1916-17 but who are now receiving coal from that source. No large tonnages are involved, but the exceptions are causing the trade to lose faith in the whole scheme. Another instance that we know is irregular is the offering of prepared sizes as an inducement to sell the slowly moving culm. Such cases may be rare but the transactions invariably leak out.

The companies are advising their trade that all their allotments will be shipped and there is every reason to believe they will be. The regular, steady consignments so much desired will not be possible under the present method of starting heavy shipments and then suddenly diverting to another market. The smaller dealer fears coal will arrive in larger quantities than he can unload without demurrage charges. All dealers claim it is almost impossible to secure help to trim coal and therefore

they will be unable to fill their yards to their capacity if it does come in bulk.

Pea coal is by all odds the most plentiful of the family sizes and many dealers are using every effort to persuade buyers of chestnut coal to use it. Egg is not so scarce in the city proper, but in the suburbs where Philadelphia's portion is chiefly consumed, it is eagerly sought. Stove and chestnut seem to grow scarcer every day and many yards have had no stocks of it for weeks.

That the smaller steam sizes drag is shown by the new ruling of the anthracite committee of the United States Fuel Administration. There is now no restriction on the tonnage of anthracite in sizes below No. 1 buckwheat that a manufacturer or a florist may receive. This is particularly pleasing to the latter, who because of having been restricted to 50 per cent. of their fuel requirements were in despair. Many of the smaller growers anticipating the winter's coal troubles quit the business last spring and summer. As it stands now the sizes of steam coal smaller than No. 1 are becoming so common that some larger users with big stocks ahead are reaching the position where they want to name the kind of coal rather than merely take in a certain size which had become the custom since the war conditions arose.

Some welcome news was conveyed to the dealers this week when the railroad companies announced they would make refund for coal lost and stolen during the so-called coal famine last winter, when crowds mobbed loaded cars of coal and carried the fuel away. Dealers have been notified to call in person and sign vouchers releasing the carrying companies from all claims in excess of those already presented.

The prices per gross ton f.o.b. cars at mines for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken.....	\$4.90	\$6.25	Buckwheat.....	\$3.40	\$4.45
Egg.....	4.80	6.15	Rice.....	2.90	3.80
Stove.....	5.05	6.40	Boiler.....	2.70	3.70
Nut.....	5.15	6.50	Barley.....	2.40	3.30
Pea.....	3.75	5.00	Culm.....	1.25	2.15

Bituminous—Soft coal continues in abundance with almost every one being fairly well supplied with good shipments. Of course, the tonnage coming into the city has shown some slight decrease due to the shortage of man power in the regions on account of the influenza epidemic reaching its height there. All restrictions as to storing seem to be down, and there is a general feeling that the coal question has been solved this winter. Certainly there never was a greater tonnage of coal above ground in this district. Even small concerns who are only accustomed to run from one car to the next have from 30 to 60 days' supply on hand.

BALTIMORE

Bituminous conditions here remain tight in the face of a constantly growing demand. Jobbers puzzled as to their status under new rule. Hard coal supply far below needs. Substitutes urged are not available.

Bituminous—With the mine forces and railroads slowly recuperating from the effects of the epidemic of influenza, there is still a movement recorded considerably below the recent normal of coal handling. The result here is that conditions for soft coal remain very tight, and this is the more marked as additional consuming concerns come into the field for a resumption of coal shipments as their reserve supplies, at one time from 60 to 120 days ahead, have dwindled to the allotment allowed by the government for non-essential and essential industries.

During the past week the local fuel administrator has sent quite a number of requests for diversion to the district representative to care for this business, not enough coal having arrived here to the account of the administrator to care for the distribution. A pretty fair line of coal is now coming through, when the fact that the government is using the best grades for strictly preferential business, is considered. Action against some mines accused of sending dirty coal through has apparently had some effect on the situation, and little real complaint is heard among consumers here now as to the grade of coal supplied.

The jobbing trade continues puzzled about the effect of the order which enables mines to bill consumers direct, when they so elect, on coal requisitioned by the fuel administrators. Some believe that only the largest mines have facilities for handling such business direct and that jobbers as a whole will not be seriously injured, while others believe that the practice will finally hit the line of business hard. The Maryland Jobbers' Association

discussed the subject, and was told of some concrete examples where purchasing agents were in danger of losing long established consuming connections, and it is understood the subject will be taken up with the Fuel Administration in Washington.

Anthracite—The hard coal supply here remains far below needs. For the first six months of the coal year it is announced that a total of 543,696 tons was received by Maryland on an allotment of slightly more than one million tons; of which Baltimore city and suburbs received 365,654 tons on an allotment of slightly more than 700,000 tons. The shipment covered both steam and coal for specialized war industries and public service corporations. Under the two-third distribution plan, however, many homes have as much coal as they can burn until January or February next, while thousands have no coal at all.

Lake Markets

PITTSBURGH

Production down 40 per cent. altogether. Next change will be improvement. Weakness in some Ohio markets. Pittsburgh coal firm.

R. W. Gardiner, production manager for the Pittsburgh district, estimates that coal production at the moment in the district is running 40 per cent. below the maximum rate which was attained just before the epidemic of influenza started. This does not mean that miners have the disease in any such proportion, as some are at home on account of sickness in the family and some have absented themselves because inoculation against the disease reduced their enthusiasm for work. Furthermore, there has been some car shortage due to railroad employees being affected by the disease. For a time the situation as to shipments east on the Pennsylvania was very bad, there being scarcely any movement, in fact. Mr. Gardiner feels that the authorities have now got the situation well in hand, as to inoculation and segregation, and that the effects of the epidemic will now wane.

Lake shipments are being maintained about as well as was expected when the diversion of 200 cars weekly to domestic trade in addition to previous movement was ordered, that being before influenza threatened. In the week ended Oct. 19 more than 300,000 tons was moved, and it is probable that the average will be about 300,000 tons a week to the end of the season. Shipments will cease within a fortnight or so.

Opening of the Black Rock gateway has allowed considerable, Ohio No. 8 to move into Canada by rail and has to an extent relieved the situation there, as to there being a surplus of coal over the demand of the markets in the zone; and with the curtailment in production generally there is less surplus in Ohio districts than there was. It remains the fact, however, that retail dealers and domestic consumers are better supplied at this time than was expected would prove the case, and the coal situation as a whole is relatively easy. As usual, exception must be made of the byproduct situation, as it is only with difficulty that the byproduct plants are supplied, and even then they do not always receive the kind of coal they require for the most efficient operation, while they receive little if any coal to place in storage.

TORONTO

Transportation conditions show improvement. Local deliveries slow owing to the epidemic. Large numbers still destitute of fuel. Remedial measures by provincial fuel administration.

Transportation conditions have latterly shown some improvement, and coal shipments from the mines are coming forward promptly. The local situation, however, is still quite serious. The work of supplying some 12,000 families reported as being completely destitute of fuel goes forward, but slowly, as a large percentage of the employees of the coal companies are laid off owing to the prevailing epidemic and deliveries are greatly retarded. The situation is particularly bad in the suburbs and outlying districts. R. Home Smith, Ontario Fuel Administrator, has warned coal dealers that matters have taken a critical turn, owing to the presence of influenza in the mining districts, which has so curtailed production as to threaten the season's supply. Dealers are urged to lay in a supply of bituminous, which is at present plentiful, and to advise the purchase of buckwheat and small sizes of an-

thracite to mix with ordinary sizes. All anthracite stocked in public buildings has been placed at the disposal of the local fuel commissioners, and made available for domestic consumption.

BUFFALO

Bituminous more plentiful. Consumers not buying freely. Anthracite not increasing. Lake shipments good.

Bituminous—Supply is ahead of the demand and there is quite some unsold coal on the market. Jobbers report that they are now receiving proffers of coal from the mines. Slack is especially plentiful. This state of things cannot last long. The influenza has cut down production materially, and there would surely be a shortage but for the closing of the lakes at the end of this month, which always makes the eastern supply easier. It will be some time before these contending influences can be sized up, and in the meantime it looks as if consumers were going out of the market too soon.

In spite of regulation, bituminous prices must now be reported as weak, but still at \$4.65 for thin vein Allegheny Valley, \$4.45 for Pittsburgh lump, \$4.20 for Pittsburgh mine run and slack, \$5.65 for smithing and smokeless, \$5.60 to \$6.10 for cannel, all per net ton f.o.b. Buffalo.

There is an effort to get a return to this market of the Ohio No. 8 after the lakes close, as it was cut off in order to supply that trade.

Anthracite—The demand keeps up, but the supply is light so far as the local trade goes, and it is likely to be so for at least another month. Some towns are adopting the plan of delivering one ton to a customer till all have some, but the retailers do not like the idea on account of the extra work.

It does not look as if the amount of coal in cellars was less than usual, but it is not well distributed. Some retailers have paid little attention to the rules and have delivered large amounts to friends and those who were most persistent in demanding coal. It is of course to their interest to do this. Everybody hopes that the shippers are right when they declare that there will be coal enough. They agree that it will be short of the demand practically all winter, for the consumers want their full supply now and will not relax their demands till they get it.

Shipments by lake continue liberal. There were no storms of consequence in October to hold up the fleet, so the loading went on unabated. Tonnage is plenty. The amount reported for the week was 140,300 net tons, of which 83,400 tons cleared for Duluth or Superior, consignee's option, 25,100 tons for Chicago, 13,800 tons for Milwaukee, 6,600 tons for Ashland, 5,500 tons for Fort William, 3,200 tons for Hancock, 2,700 tons for Racine.

The rate to Racine has advanced 25c., and Hancock, 27c., the list being \$1.25 to Racine, 75c. to Hancock, 60 to 65c. to Chicago, 55c. to Milwaukee and 48c. to Duluth, Ashland and Fort William, per net ton, f. o. b. vessel.

CLEVELAND

Production in eastern and southern Ohio has been severely cut by the influenza epidemic, but on account of the decreased demand for bituminous for the lake trade this loss is scarcely being felt. Bituminous supply for the retail trade finally has become equal to the demand. Unexpectedly, the lake trade will come to an end 15 to 20 days before the date fixed, but the Northwest will receive its full quota in spite of this fact.

Bituminous—Production losses of 40 to 50 per cent. suffered by southern and eastern Ohio mines because of influenza are common reports just now. As operators were believing that the worst was over the epidemic broke out with renewed violence, and because of the scarcity of physicians and nurses in the small mining communities the death rate has been alarmingly large. Railroad crews have been affected even worse than the mine workers, but even so car supply has been exceeding requirements. For the first time in months retail dealers report receipts of bituminous equal to the demand. Also for the first time in months, operators are offering tonnage to retail dealers. Domestic consumers, however, are well coalled and dealers are not swift to seize at operators' proffers.

With shipments of slack and run-of-mine cut off from the Northwest, the supply for industrial consumers has increased appreciably. The demand for slack for more than a year has been greater than the supply, and all the slack turned on the market is being snapped up eagerly. Industrial and domestic receipts are coming in at about the same gait as for the past

two weeks, the lost production due to influenza being taken up by the slackening lake trade.

Anthracite—Advice of the Ohio fuel administration that No. 1 buckwheat—which is practically all that has been coming here for some time—can be profitably burned when mixed with 70 per cent. stove and egg sizes is being accepted with reservations. All that is lacking is the remaining 70 per cent., dealers point out. Receipts of anthracite continue at a small fraction of the demands, and arrival of 100 cars a week is considered big.

Lake Trade—Diversion of vessel tonnage by the British has caused congestion at North Atlantic grain elevators. Consequently, elevators at Buffalo are choked, and the plans to divert lake carriers from ore to grain for all of November and half of December have been abandoned. As a result, the lake season will come to a close two or three weeks earlier than expected, and practically no coal will be floated after Dec. 1, it is now believed. Last December over 660,000 tons of bituminous were loaded for the Northwest. October's shipments, however, in the final analysis will be found about 1,000,000 tons ahead of the schedule, which called for 3,500,000 tons, and 2,400,000 tons in November, as planned, will just about see the Northwest supplied its 28,000,000 tons. The heavy movement in the first three weeks of October is all that has saved the Northwest, in view of the unexpected turn of events. With no grain to bring down there will be no need of coal ballast for the planned upbound trips. Upper lake docks, however, are so heavily loaded down the little coal that now is coming forward to Lake Erie ports is not consigned. Where bituminous loading at the lower lake docks averaged about 1,100,000 tons a week for the first three weeks of October, it now is at scarcely more than 700,000 tons. Modification of the zone lines, giving Ohio mines a larger outlet for the coal capacity that has been going up the lakes, is expected to take up the slack that will result when influenza wanes and full time production is resumed.

DETROIT

Steam coal is attracting less interest. Domestic buyers seem inclined to delay, hoping to get anthracite. Lake trade maintains good volume.

Bituminous—Although good steam coal is not overplentiful, the consumers seem less eager to buy than they were a few weeks ago. The fact that a number of the large manufacturing plants have fairly large reserves, while many of the industrial plants of lesser magnitude have no place to put more than a carload or so, is the explanation of the quieter state of the local market, according to jobbers. The insufficiency of storage accommodations at many of the plants also is preventing numerous consumers of steam coal from taking full advantage of the Federal Fuel Administration's recent relaxation of the restrictions on the size of reserves.

Jobbers say also that the consumers of steam coal, to assure a sufficient supply of stock, have been taking more or less coal of poor quality, which they desire to use before adding to their supply. The retail dealers are described as having found themselves confronting a similar problem, created by stocks of mine-run and coal from Illinois mines, which restrict their buying of the prepared sizes of better grades of coal coming into the market from Ohio and West Virginia. Domestic consumers, use jobbers say, are asking for the coal that dealers are in an unfavorable position to supply and are objecting to receiving the coal on hand.

Anthracite—Anthracite has been moving into the Detroit market more freely during the month and receipts are estimated at around 90,000 tons, part of which must be charged off on deliveries to be made later in the year. By crowding the early shipments it was planned to make possible distribution of part of their winter allotment to a greater number of families before weather conditions arise that may interfere with the program. The increase in movement threw a heavy burden on retailers. With labor hard to get and working forces reduced by the epidemic of influenza, delivery from cars to customers was not in all cases possible, and some of the dealers were obliged to unload cars in their yards, incurring the expense of handling the same stock several times.

COLUMBUS

A slack in the demand for both mine-run and screenings characterizes the Ohio trade. Restrictions on shipping mine-run into Michigan have produced an oversupply. Mine-run from the Hocking field cannot be

shipped to the lakes. There is a good demand for lump and lake tonnage.

The feature of the coal trade in Ohio during the past week was the large amount of mine-run on the market and the efforts required on the part of sales agents to sell it. This is so different from the conditions that have prevailed for the past year or more as to be worthy of special notice. With mine-run kept out of the hands of Michigan steam users and further restrictions against shipping it to the lakes, the supply of that grade became large. Steps were taken at once to get the railroads to take mine-run in preference to using Indiana coal, as was ordered, and after several days the Fuel Administration secured the modification. That helped to relieve the situation to a certain extent. Operators had about decided that they would have to curtail production unless some relief was afforded. Steam users in Ohio are generally stocked up to the limit and in many cases have fuel supplies for three months in the future.

The lake trade is still active and a large tonnage is still moving to the Northwest. Reports indicate that the requisition for that section will be filled unless something unforeseen occurs. There is sufficient mine-run and screenings in the upper lake region, which has resulted in the prohibitions against shipping those grades from Ohio.

The retail trade is rather quiet because of the continued warm weather. Dealers have large stocks ahead and most of them have all available storage space filled. Dealers have a good supply of mine-run and are not accepting any more. They are still in the market for lump when obtainable. Pocahontas is out of the market completely. The Ohio dealers are depending largely on Ohio mined coal for their supply. Some West Virginia grades are being received. Retail prices are firm at former levels.

CINCINNATI

With demand good in all departments, the epidemic is the most serious factor in the supply. Little improvement is reported from mining districts.

Somewhat cooler weather prevailing during the past week tended to stimulate consumption of coal for heating purposes, and to that extent to improve the demand, which, however, has remained about normal, with an excellent supply, especially of steam coal. Domestic coals are also available in good supply, and several of the larger retail concerns are making vigorous sales efforts, by way of advertising, solicitation and otherwise, a condition which it was hardly anticipated would prevail during this season. Good receipts of rail and river coal, enabling these companies to accumulate large yard supplies, gave them the opportunity to do some aggressive sales work, and the opportunity was not overlooked.

Conditions at the mines are threatening seriously to interrupt the forwarding of adequate supplies of fuel, however, as the influenza epidemic, which is at its height in the Ohio, West Virginia and Kentucky fields within overnight journeys from this point, has reduced working forces badly. Should cold weather, which is daily expected by the weather office, come suddenly, bringing its usual large demand for fuel, receipts might prove inadequate. It is hoped that the epidemic is nearing its end, but just now the daily record of new cases and of deaths does not indicate any slackening of the power of the disease.

LOUISVILLE

General demand for coal draggy with possible exception of better grades of eastern Kentucky lump. Retailers loading up first real stocks of a long time. All grades of steam dull.

Mild October weather, coupled with the fact that domestic consumers as well as steam consumers are well stocked, has resulted in all grades of Western Kentucky coal being draggy, while Eastern Kentucky domestic coal is the only grade that is showing a real demand. It is claimed that Eastern Kentucky lump stands a good chance of being in demand throughout the entire season, owing to the small supplies that have been received to date, and the fact that no Virginia or Pittsburgh coal to speak of has been coming by rail or water. However, steam consumers using the better grades of Eastern Kentucky are apparently well stocked and are not buying liberally.

Western Kentucky domestic and steam coal has been sold freely on the market during the past few days, as several of the Western Kentucky operators were unable to make full delivery on Southern contracts, owing to influenza which closed down many industrial plants and resulted in a halt being called on the Western Ken-

tucky shippers. The result was that these shippers shoved as much coal into Louisville as the market could take care of. The steam grades were not wanted, while the domestic demand was chiefly from the retailers, who would have been willing to take considerably more coal if they could just get the labor to unload from cars.

There has been a considerably larger supply of Hazard coal coming on the local market within the past two weeks or so, and many consumers who had been objecting to taking deliveries of lower grades of western Kentucky accepted this coal.

Jobbers have been handling a little Indiana coal into Northern Indiana points, and have been fairly active in a small way in handling Kentucky coal in Louisville and out through the state, but as a whole the jobbing trade has been dull for the past two or three weeks in so far as steam and western Kentucky lump is concerned. Retailers are in the same fix, and being unable to sell have gone ahead and accumulated from a week to two weeks or better supplies of coal on the local yards, this being by far the best supply of domestic coal that has been on hand in the city at one time in a year or eighteen months.

Production has been very low as a result of influenza, which is showing much improvement, and which appears to be virtually checked in many localities. Many of the mines are beginning to get out something like normal production again. Eastern Kentucky mines expect to continue making deliveries to the lake region for three weeks if weather conditions permit, while southeastern Kentucky is still shipping south, and the Elkhorn district to the gas and byproduct plants. The short production caused by the epidemic has not been appreciably felt, and it is hardly believed that it will be felt to any great extent due to the fact that the country was well stocked up, and there was not much place to put fuel when the epidemic interfered.

BIRMINGHAM

With influenza on the wane coal production again improving. Steam market rather inactive. Domestic strong. Car supply adequate to requirements.

With the influenza epidemic, which has so seriously retarded coal production in Alabama for the past two weeks, rapidly losing its grip, the output is now showing a gradual upward trend. Sickness among mine workers at some camps completely paralyzed operations for several days, and caused more or less loss of tonnage at every mine in the state. The output for the week ending Oct. 19, was 323,310 net tons, the lowest since the Government has been tabulating production.

Despite the fact that there has been such a sharp decline in coal produced the steam market has not been stimulated to any noticeable extent. Buyers are manifesting a passive attitude, and new business and bookings already in hand are about equal to the available tonnage. Shippers have instructions to fill railroad orders 100 per cent, before supplying other consumers.

The domestic trade is very active and the shortage in supply is being felt by both consumers and dealers. Stocks on yards are low and retailers have much unfinished business on their books. The State Fuel Administrator has restricted delivery by dealers to one ton to each family at any one time, effective Nov. 1.

The Fuel Administration has granted an increase in the price of coal mined by the Warrior-Pratt Coal Co., fixing a figure of \$2.25 for mine-run, \$2.50 for prepared sizes, and \$2 for slack and screenings. The West Helena Coal Co. is also allowed an advance, the new prices being \$3 for mine-run; \$3.30 for prepared and \$2.65 for slack and screenings. To the above figures is to be added 45c. per ton.

Cars are now plentiful in this district and no complaints are reported on service being afforded.

Coke

CONNELLSVILLE

Curtailment in production less than might have been expected. Price expectations in event of hostilities ceasing.

Production of coke and of byproduct coal in the Conneltsville region, while considerably curtailed by the epidemic of influenza, is considered relatively satisfactory in the circumstances.

While supplies of coke and byproduct coal are curtailed, there has been no particular shortage of coke at blast furnaces

such as would in itself interfere with pig iron production. Indeed, a number of blast furnaces have been in more danger of banking on account of the influenza epidemic decreasing their working forces, than from any shortage of coke.

The imminence of a cessation of hostilities has brought to the front consideration of market conditions in such event. The iron and steel trade has hitherto regarded all Government prices as of virtually the same order, although iron and steel prices are fixed by the War Industries Board by agreement with the producers, while coal and coke prices are fixed by the Fuel Administration, under authority of the Lever act. For the transitory period the case is different. If it became desirable to sustain prices in the period from war time to peace time conditions, an agreement with producers as to minimum prices (fixed prices thus far having been a maximum, not minimum) might encounter legal difficulties. Coke, accordingly, takes a place by itself. The Fuel Administration's authority extends at least to the declaration of peace by Presidential proclamation, which doubtless will occur long after the cessation of actual hostilities has made business start seeking a peace basis, while furthermore a broad construction of the Lever act would seem to indicate that the authority granted is to fix prices either way, maximum or minimum, it being simply a detail that the Fuel Administration found that what was needed for the good of the country, being at war, was a maximum price for coke and not a minimum. The market remains quotable at the set limits: Furnace: \$6; foundry, 72-hour selected, \$7; crushed, over 3-in., \$7.30; clean screenings, over 3-in., \$5.50, per net ton at ovens.

The "Courier" reports coke production in the Conneltsville and Lower Conneltsville region in the week ended Oct. 26 at 302,394 tons, a decrease of 11,651 tons, and raw coal shipped 234,517 tons, a decrease of 11,561 tons.

Middle Western

GENERAL REVIEW

No change over recent weeks. Car shortage and influenza decrease production. Only thing that will put life into Middle West market is a radical readjustment of zones.

The market is still weak, and this is rather remarkable when one considers that the production figures have taken a heavy drop, and at the same time an outside factor has entered the market and bought a large quantity of coal. We are referring to some of the railroads who have mines of their own, ample in size to take care of all the wants of their railroad owners. These mines, however, have been down on account of the influenza, and as a direct result their owners have been forced into the open market to purchase their coal. It is worth stating in passing, that in most cases these railroads have been able to purchase as much coal as they desire, at a figure considerably below the prices set by the Government.

The car question is again coming to the fore. The order some time back, taking coal-carrying equipment from the Middle West fields and sending it to eastern mines, is beginning to be felt by the operators, especially in the southern Illinois field, and in some districts of Indiana. This car shortage, while it is not serious at the present time, will nevertheless decrease the production figures for the week to a noticeable extent.

The prevailing question among the operators is—"What will the situation be when operating conditions come back to normal, when it has already been demonstrated that the market for Illinois and Indiana coals cannot absorb even a greatly decreased tonnage?" The only answer to this question is a radical readjustment of the zones, which will give producing territories affected a larger and more extensive market for their productions.

The recent changes made in Zone D, for the benefit of the Indiana operators, have not proved as beneficial as hoped for, as there has been practically no change in the market on Indiana coals. There is a possibility, however, that freight rates will be published for coal from mines in Indiana to points in Michigan hitherto not reached, except by expensive local rates. If these proposed rates are published, it will open up practically a new territory for Indiana, and ought to strengthen the present weak market in that district to a noticeable degree.

CHICAGO

Plenty of steam and domestic coal in Chicago. Little anthracite being received.

Coal continues to be plentiful in Chicago, both steam and domestic. We understand that today there are approximately three hundred cars of coal in the central district of Illinois, that are standing on the track, on which no disposition has been received. This is a decidedly significant thing, especially in view of the fact that both the State Fuel Administration and the District Representative for the Fuel Administration are doing everything they can to move this coal. There are an increasing number of fires reported in the various large storage piles throughout the city, and this, no doubt, has a tendency to hinder further purchases on the part of the large consumers.

The domestic situation is practically the same as the steam situation, with plenty of coal of all kinds being offered, and orders being canceled rather than placed.

There is little hope extended to the trade, so far as anthracite is concerned, and the parties who are handling this question for the Fuel Administration are still continuing to create considerable criticism.

ST. LOUIS

A lagging market, with no demand for either steam or domestic, and a surplus of all coals offered. Country business weak and prices unsettled. Mild weather continues and future is not promising. Cars plentiful and transportation good.

The local domestic demand at the present time is nil. The mild weather has even eliminated the usual buying of Standard coal among the poorer classes. This, of course, will come with colder weather. Steam users are buying just as little as possible, knowing that this attitude will force lower prices; and it has already done so in the case of Standard coal. Standard screenings are down to \$1.50, 2-in. lump to \$2.15, with the other sizes breaking below the Government maximum. In the Standard districts the mines are working only to the extent that orders are furnished. There is no car shortage. Conditions in general throughout the Standard field are satisfactory, or would be if there were orders. Labor seems to be better and car supply and transportation satisfactory.

In the Mt. Olive field the mines are working steadily, but the operators are having a hard time to dispose of the tonnage. There is a surplus in this field, as well as in others. Conditions are much better than in the Standard field, as this coal moves to better markets, and under better rates and conditions.

In the Carterville and Duquoin fields the car supply has improved to a great extent recently, and conditions in a general way are satisfactory, except that at some mines domestic orders are being caught up with. Throughout all southern Illinois the question of labor at some mines has been serious on account of the influenza epidemic.

The railroad tonnage throughout the entire district continues heavy. As a matter of fact, in the Standard and Mt. Olive fields if it were not for the railroad tonnage the general average of working days at the mines on commercial coal would be about 14 days per week.

The domestic tonnage, however, in the Carterville and Duquoin fields for the present could take all the working time, but these orders will be caught up with in the course of ten days or two weeks' time and then the railroad tonnage would have to come in in order to keep the property running.

A strenuous effort has been made on the part of the Illinois operators and dealers in the State of Missouri and states west of the river to have the Fuel Administration release the present restrictions on zones for Illinois coals.

No outside coals are coming into St. Louis. There are no changes in the retail prices, and the wholesale prices are with the exception as noted above the same as last week, which are:

	Williamson and Franklin County	Mt. Olive and Staunton	Standard
6-in. lump...	\$2.55@2.75	\$2.55@2.75	\$2.40@2.70
3x6-in. egg...	2.55@2.75	2.55@2.75	2.40@2.70
2x3-in. nut...	2.55@2.75	2.55@2.75	2.40@2.70
Washed:			
No. 1.....	3.05@3.20	3.05@3.20
No. 2.....	3.05@3.20	3.05@3.20
No. 3.....	3.05@3.20	3.05@3.20
Mine Run...	2.35@2.50	2.35@2.50	2.20@2.30
Screenings...	2.17@2.32	2.17@1.32	1.50@1.60
Special preparation on Carterville is 10 cents. extra Williamson & Franklin Co. rate is \$1.10. Other fields 95 cents.			

CURRENT PRICES—MATERIALS & SUPPLIES

IRON AND STEEL

PIG IRON—Quotations compiled by The Matthew Addy Co.:

	Current	One Month Ago
CINCINNATI		
No. 2 Southern.....	\$37.60	\$37.60
Northern Basic.....	34.80	34.80
Southern Ohio No. 2.....	35.80	35.80
NEW YORK, Tidewater delivery		
Penna. 2X.....	39.55	39.15
Virginia No. 2.....	41.70	41.70
Southern No. 2.....	41.70	41.70
BIRMINGHAM		
No. 2 Foundry.....	34.00	34.00
PHILADELPHIA		
Eastern Pa. 2X.....	39.15	38.65*
Virginia No. 2.....	40.50	40.50†
Basic.....	36.90	36.90*
Grey Forge.....	36.90	36.90*
Bessemer.....	39.10	38.80*
CHICAGO		
No. 2 Foundry Local.....	34.50	34.50
No. 2 Foundry Southern.....	39.00	39.00
PITTSBURGH, including freight charge from the Valley		
No. 2 Foundry Valley.....	35.40	35.40
Basic.....	34.40	34.40
Bessemer.....	36.60	36.60

*F.o.b. furnace. †Delivered

STRUCTURAL MATERIAL—The following are the base prices, f.o.b. mill, Pittsburgh, together with the quotations per 100 lb. from warehouses at the places named:

	Mill	New York	St. Louis	Chicago
	Pittsburgh	Current	One Year Ago	
Beams, 3 to 15 in.....	\$3.00	\$4.27	\$5.25	\$4.27
Channels, 3 to 15 in.....	3.00	4.27	5.25	4.27
Angles, 3 to 6 in. 1/2 in. thick.....	3.00	4.27	5.25	4.27
Tees, 3 in. and larger.....	3.05	4.27	5.30	4.27
Plates.....	3.225	4.77	10.00	4.52

BAR IRON—Prices in cents per pound at cities named are as follows:

	Pittsburgh	St. Louis	Denver	Birmingham
	3.50	4.50	4.85	4.47

NAILS—Prices per keg from warehouse in cities named:

	Mill	St. Louis	Chicago	Birmingham	San Francisco	Dallas
	Pittsburgh					
Wire.....	\$3.50	\$4.37	\$5.11	\$4.32	\$5.35	\$4.75
Cut.....	4.00	6.50	5.61	4.47	5.75	

TRACK SUPPLIES—The following prices are base per 100 lb. f.o.b. Pittsburgh for carload lots, together with the warehouse prices at the places named:

	Pittsburgh	Cincinnati	Chicago	St. Louis	San Francisco	Birmingham	Denver
Standard railroad spikes 1 1/2-in. and larger.....	\$3.90	\$6.00	\$4.50	\$5.30	\$6.70	\$6.00	\$5.55
Track bolts.....	4.90	8.90	5.50	5.50	8.00	8.00	6.55
Standard section angle bars.....	3.25		4.45	Prem.	5.15		4.95

COLD DRAWN STEEL SHAFTING—From warehouse to consumers requiring fair-sized lots, the following discounts hold:

	Cincinnati	Cleveland	Chicago	St. Louis	Denver	Birmingham
	17 1/2% List	+10%	+15%	+30%	+30%	

HORSE AND MULE SHOES—Warehouse prices per 100 lb. in cities named:

	Mill	Cincinnati	Chicago	St. Louis	Birmingham
	Pittsburgh				
Straight.....	\$5.75	\$7.75	\$6.50	\$6.25	\$8.00
Assorted.....	5.90	7.75	6.50-7.00	6.40	8.25

Cincinnati—Horseshoe nails sell for \$4.50 to \$5 per 25-lb. box.

CAST-IRON PIPE—The following are prices per net ton for carload lots:

	New York	One Month Ago	Chicago	St. Louis	San Francisco
	Current				
4 in.....	\$70.70	\$64.35	\$68.50	\$69.80	\$80.50
6 in. and over.....	67.70	61.35	65.50	66.80	77.50

Gas pipe and 16-ft. lengths are \$1 per ton extra.

STEEL RAILS—The following quotations are per ton f.o.b. Pittsburgh and Chicago for carload or larger lots. For less than carload lots 5c. per 100 lb. is charged extra:

	Pittsburgh	Chicago
	Current	One Year Ago
Standard Bessemer rails.....	\$57.00	\$38.00
Standard openhearth rails.....	55.00	40.00
Light rails, 8 to 10 lb.....	*3.135 (100lb.)	83.00
Light rails, 12 to 14 lb.....	*3.09 (100lb.)	82.00
Light rails, 25 to 45 lb.....	*3.00 (100lb.)	75.00

*Government price per 100 lb.

OLD MATERIAL—The prices following are per gross ton paid to dealers and producers in New York. In Chicago and St. Louis the quotations are per net ton and cover delivery at the buyer's works, including freight transfer charges:

	New York	Chicago	St. Louis
No. 1 railroad wrought.....	\$30.90	\$30.00	\$33.00
Stove plate.....	26.10	25.00	25.50
No. 1 machinery cast.....	34.00	29.00	20.50
Machine shop turnings.....	16.85	16.50	18.50
Cast borings.....	16.85	16.50	18.50
Railroad malleable cast.....	31.10	29.00	32.50

COAL BIT STEEL—Warehouse price per pound is as follows:

	New York	Cincinnati	Birmingham	St. Louis	Denver
	\$0.12	\$0.16 1/2	\$0.18	\$0.19	\$0.18 1/2

DRILL STEEL—Warehouse price per pound:

	New York	St. Louis	Birmingham
Solid.....	16c.	16c.	15c.
Hollow.....	24c.		

PIPE—The following discounts are for carload lots f.o.b. Pittsburgh; basing card of Nov. 6, 1917, for steel pipe and for iron pipe:

	Steel	Galvanized	Iron	Galvanized
Inches	Black		Black	
1/2, 3/4 and 1.....	44%	17%	33%	17%
1 1/4 to 3.....	48%	33 1/2%		
	51%	37 1/2%		

LAP WELD

	Steel	Galvanized	Iron	Galvanized
Inches	Black		Black	
2.....	44%	31 1/2%	26%	12%
2 1/2 to 6.....	47%	34 1/2%	28%	15%
			28%	15%

BUTT WELD, EXTRA STRONG PLAIN ENDS

	Steel	Galvanized	Iron	Galvanized
Inches	Black		Black	
1/2, 3/4 and 1.....	40%	22 1/2%	33%	18%
1 1/4 to 1 1/2.....	45%	36 1/2%		
	49%	36 1/2%		

LAP WELD, EXTRA STRONG PLAIN ENDS

	Steel	Galvanized	Iron	Galvanized
Inches	Black		Black	
2.....	42%	30 1/2%	27%	14%
2 1/2 to 4.....	45%	33 1/2%	29%	17%
4 1/2 to 6.....	44%	32 1/2%	28%	16%

From warehouses at the places named the following discounts hold for steel pipe:

	New York	Black	Chicago	St. Louis
1/2 to 3 in. butt welded.....	40%	43%	37%	37%
3 1/2 to 6 in. lap welded.....	36%	39%	33%	33%

	New York	Galvanized	Chicago	St. Louis
1/2 to 3 in. butt welded.....	28%	28%	22%	22%
3 1/2 to 6 in. butt welded.....	25%	25%	19%	19%

Malleable fittings. Class B and C, from New York stock sell at list + 15%. Cast iron, standard sizes, 5% off.

SHOP SUPPLIES

NUTS—From warehouse at the places named, on fair sized orders, the following amount is deducted from list:

	New York	Cleveland	Chicago
	Current	One Year Ago	Current
Hot pressed square.....	\$2.50* List	\$1.25	\$1.65
Hot pressed hexagon.....	2.50* List	1.05	1.50
Cold punched square.....	2.50* List	.75	1.25
Cold punched hexagon.....	2.50* List	.75	1.25

* List plus.

Semi-finished nuts sell at the following discounts from list price:

	New York	Cleveland	Chicago
	Current	One Year Ago	Current
New York.....	40%	50%	50%
Chicago.....	50%	50%	50%
Cleveland.....	50 + 10%	50%	50%

MACHINE BOLTS—Warehouse discounts in the following cities:

	New York	Cleveland	Chicago
	Current	One Year Ago	Current
1/2 by 4 in. and smaller.....	30%	40 + 10%	37%
Larger and longer up to 1 in. by 30 in.....	15%	20 + 5%	25-5%

WASHERS—From warehouses at the places named the following amount is deducted from list price:

	New York	Cleveland	Chicago
	Current	One Year Ago	Current
For wrought-iron washers:			
New York.....	\$2.50	List	\$2.50
For cast-iron washers the base price per 100 lb. is as follows:			
New York.....	\$5.00	Cleveland.....\$4.25	Chicago.....\$4.50

RIVETS—The following quotations are allowed for fair sized orders from warehouse:

	New York	Cleveland	Chicago
	Current	One Year Ago	Current
Steel 1/2 and smaller.....	30%	45-5%	40%
Tinned.....	30%	45-5%	40%

Button heads, 1/2, 1, 1 1/2 in. diameter by 2 in. to 5 in. sell as follows per 100 lb.:

	New York	Cleveland	Chicago	Pittsburgh
New York.....	\$5.65	\$5.15	\$5.67	\$4.65

Coneheads, same sizes:

	New York	Cleveland	Chicago	Pittsburgh
New York.....	\$5.75	\$5.25	\$5.77	\$4.75

MISCELLANEOUS

GREASES—Prices are as follows in the following cities in cents per pound for barrel lots:

	Cincinnati	St. Louis	Birmingham	Denver
Cup	7.2-8.2	7	8	12½
Fiber or sponge	7.2-8.2	7	8	20
Transmission	7.2-8.2	7	8½	20
Axle	4.6-4.9	4	4	5½
Gear	4.9-7.1	4	8	9
Car journal	4.9	4	5	8½

BABBITT METAL—Warehouse prices in cents per pound:

	New York	Cleveland	Chicago
	Current	Current	Current
Best grade	95.00	93.00	96.00
Commercial	50.00	40.00	25.00

HOSE—Following are prices of various classes of hose:

	Fire	50-Ft. Lengths
		75c. per ft.
Underwriters' 2½-in.		40%
Common, 2½-in.		40%
	First Grade	Second Grade
1-in. per ft.	\$0.55	\$0.30

Steam—Discounts from list
First grade.....30% Second grade.....30-5% Third grade.....40-10%

LEATHER BELTING—Present discounts from list in cities named:

	Medium Grade	Heavy Grade
St. Louis	45%	35%
Denver	35-5%	30%
Birmingham	35%	35%
Chicago	45%	40%
Cincinnati	40-10%	40%

RAWHIDE LACING—25% off list.

PACKING—Prices per pound:

Rubber and duck for low-pressure steam	\$0.99
Asbestos for high-pressure steam	1.76
Duck and rubber for piston packing	1.10
Flax, regular	.99
Flax, waterproofed	1.21
Compressed asbestos sheet	1.10
Wire insertion asbestos sheet	1.30
Rubber sheet	.66
Rubber sheet, wire insertion	.99
Rubber sheet, duck insertion	.55
Rubber sheet, cloth insertion	.25
Asbestos packing, twisted or braided, and graphited, for valve stems and stuffing boxes	1.21
Asbestos wick, ¼- and 1-lb. balls	.75

WIRE ROPE—Discounts from list price on regular grades of bright and galvanized are as follows:

	New York	St. Louis
	Current	Current
Galvanized iron rigging	+20%	
Galvanized cast steel rigging	List	
Bright plain rigging	30%	
Bright cast steel	17½%	
Bright iron and iron tiller	5%	

MANILA ROPE—For rope smaller than 1-in. the price is ¼ to 2c. extra; while for quantities amounting to less than 600 ft. there is an extra charge of 1c. The number of feet per pound for the various sizes is as follows: 1-in., 8 ft.; 1½-in., 6; 2-in., 4½; 2½-in., 3½; 3-in., 2½; 4-in., 2 ft. 10 in.; 5-in., 2 ft. 4 in. Following is price per pound for 1-in. and larger, in 1200-ft. coils:

	Birmingham	Chicago
	Current	Current
Boston	\$0.33	
New York	.36	
Cincinnati	.33	
Chicago	.34	
St. Paul	.34	
San Francisco	.32	

PIPE AND BOILER COVERING—Below are discounts and part of standard lists:

Pipe Size	Standard List	Thickness	Price
	Per Lin. Ft.		per Sq. Ft.
1-in.	\$0.27	1-in.	\$0.27
2-in.	.36	1½-in.	.30
4-in.	.80	2-in.	.45
6-in.	.60	2½-in.	.60
8-in.	1.10	3-in.	.75
10-in.	1.30	3½-in.	1.05

85% magnesia high pressure.....List

For low-pressure heating and return lines.....List

LINSEED OIL—These prices are per gallon:

	New York	Cleveland	Chicago
	Current	Current	Current
Raw in barrel	\$1.61	\$1.70	\$1.65
5-gal. cans	1.76	2.00	1.85

* Nominal.

WHITE AND RED LEAD in 500-lb. lots sell as follows in cents per pound:

	Red	White
	Current	Current
100-lb. keg	14.00	14.00
25 and 50-lb. kegs	14.25	14.25
12½-lb. keg	14.50	14.50
5-lb. cans	15.25	15.25
1-lb. cans	17.00	17.00

COMMON BRICK—The prices per 1000 in cargo or carload lots are as follows:

Cincinnati	\$16.75	Birmingham	\$15.00
St. Louis	12.00	Denver	9.50

WIRING SUPPLIES—New York prices for tape and solder are as follows:

Friction tape, 1 lb. rolls	48c. per lb.
Rubber tape, 1-lb. rolls	60c. per lb.
Wire solder, 50-lb. spools	46c. per lb.
Soldering paste, 2-oz. cans	\$1.20 per doz.

PREPARED ROOFINGS—Standard grade rubbered surface, complete with nails and cement, costs per square as follows in New York, St. Louis, Chicago and San Francisco.

	1-Ply	2-Ply	3-Ply
	C.I.	L.C.I.	C.I.
No. 1 grade	\$1.45	\$1.70	\$1.85
No. 2 grade	1.30	1.55	1.65

Asbestos asphalt saturated felt (14 lb. per square) costs \$5.35 per 100 lb. Slate-surfaced roofing (red and green) in rolls of 108 sq. ft. costs per \$2.40 roll in carload lots and \$2.65 for smaller quantities. Shingles, red and green slate finish cost \$5.75 per square in carloads, \$6.75 in smaller quantities, in Philadelphia.

ROOFING MATERIALS—Prices per ton f.o.b. New York or Chicago:

	Carload Lots	Less than Carload Lots
Tarfelt (14 lb. per square of 100 sq. ft.)	\$64.00	\$65.00
Tar pitch (in 400-lb. bbl.)	21.00	22.00
Asphalt pitch (in barrels)	40.00	45.50
Asphalt felt	72.50	77.00

HOLLOW TILE—Price per block in carload lots for hollow building tile:

	New York	Chicago	St. Louis	San Francisco	Dallas
	Current	Current	Current	Current	Current
4x12x12	\$0.1025*	\$0.07	\$0.07	\$0.1125	\$0.1032
6x12x12	.1350*	.1512	.10	.15	.1444
8x12x12		.1836	.12	.14	.1856
10x12x12		.216	.14	.17	.2064
12x12x12		.27	.195	.20	.2888

* Partition tile

LUMBER—Price of yellow pine per M in carload lots:

	1-in. Rough	2-in. T. and G.	8x8 In. x 20 Ft.
	10 In. x 16 Ft.	10 In. x 16 Ft.	10 In. x 16 Ft.
St. Louis	\$34.38	\$30.75	\$36.75
Birmingham	33.00	33.00	29.00
Denver	43.25	35.00	43.00
Cincinnati	45.00	44.00	39.00

STEEL SHEETS—The following are the prices in cents per pound from jobbers' warehouse at the cities named:

	New York	Cleveland	Chicago
	Current	Current	Current
*No. 28 black	5.00	6.52	6.495
*No. 26 black	4.90	6.40	6.395
*Nos. 22 and 24 black	4.85	6.37	6.345
*Nos. 18 and 20 black	4.80	6.32	6.295
No. 16 blue annealed	4.45	5.72	5.695
No. 14 blue annealed	4.35	5.62	5.595
No. 10 blue annealed	4.25	5.42	5.495
*No. 28 galvanized	6.25	7.77	7.745
*No. 26 galvanized	5.95	7.47	7.445
No. 24 galvanized	5.80	7.32	7.295

* For painted corrugated sheets add 30c. per 100 lb. for 25 to 28 gage; 25c. for 19 to 24 gages; for galvanized corrugated sheets add 5c., all gages.

COPPER WIRE—Prices per 1000 ft. for rubber-covered wire in following cities:

	Denver	St. Louis	Birmingham
	Single	Double	Single
No. 14	\$15.00	\$21.00	\$35.00
10	25.65	28.90	57.45
8	36.45	40.25	80.30
6	57.40	61.70	130.00
4	83.40	88.70	182.00
2	126.60	132.80	242.00
1	164.15	172.40	290.00
0	206.80	206.80	360.00
00	278.80	278.80	435.00
000	341.65	341.65	
0000	417.05	417.05	

EXPLOSIVES—Price per pound of dynamite in small lots and price per 25-lb. keg for black powder:

	Low Freezing	Gelatin	Black Powder
	20%	40%	60%
New York	\$0.31	\$0.38	\$0.42
Boston	.25	.28	.35
Cincinnati	.19	.23	.29
Kansas City	.21	.27	.34
New Orleans	.21	.28	.35
Seattle	.25	.32	.40
Chicago	.19	.23	.34
St. Paul	.20	.27	.34
St. Louis	.20	.27	.34
Denver	.18	.26	.33
Dallas	.26	.33	.40

FREIGHT RATES—On finished steel products in the Pittsburgh district including plates, structural shapes, merchant steel, bars, pipe fittings, chain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished), chains, etc., the following freight rates per 100 lb. are effective:

Boston	\$0.295	New Orleans	\$0.41
Buffalo	.195	New York	.27
Chicago	.295	Philadelphia	.255
Cincinnati	.255	St. Louis	.365
Cleveland	.195	St. Paul	.32
Denver	1.015	Pacific Coast (all rail)	1.275
Kansas City	.615		

Note—Add 3% transportation tax.